# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Seminar II |
| **Course Code** | CSD0502[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business)**(BL3-Apply)**<br>**CO2-** CO2: Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website) **(BL4-Analyze)**<br>**CO3-** CO3: Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL4-Analyze)**<br>**CO4-** CO4: Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL5-Evaluate)**<br>**CO5-** CO5: Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Industrial Visit and Final Presentation and Report | Internships | BL5-Evaluate | 150 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 24 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | **Seminar |
| **Course Code** | CSD0301[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business)**(BL3-Apply)**<br>**CO2-** CO2: Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website) **(BL4-Analyze)**<br>**CO3-** CO3: Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL4-Analyze)**<br>**CO4-** CO4: Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL5-Evaluate)**<br>**CO5-** CO5: Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Industrial Visit and Final Presentation and Report | Internships | BL5-Evaluate | 150 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 24 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Minor Project - I |
| **Course Code** | CSD0603 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Conduct in-depth research and critically analyze existing solutions in the chosen project area within computer science or information technology. (Evaluate)iples to develop a campaign for a local business) **(BL3-Apply)**<br>**CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design)**(BL4-Analyze)**<br>**CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop)**(BL4-Analyze)**<br>**CO4-** CO4: Apply advanced software engineering principles, project management principles, and design patterns to ensure the solution is robust, scalable, and maintainable in the long term. (Design)**(BL5-Evaluate)**<br>**CO5-** CO5: Utilize database management systems or advanced programming paradigms (e.g., object-oriented, functional, concurrency control) to enable efficient data storage, retrieval, and manipulation within the solution or to optimize the solution's efficiency and performance. (Develop)**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Project Design Document | PBL | BL5-Evaluate | 50 |
| I | Project Implementation & Testing | PBL | BL6-Create | 50 |
| I | Project Documentation | PBL | BL6-Create | 50 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 24 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Seminar III |
| **Course Code** | CSD0702[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business)**(BL3-Apply)**<br>**CO2-** CO2: Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website) **(BL4-Analyze)**<br>**CO3-** CO3: Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL4-Analyze)**<br>**CO4-** CO4: Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL5-Evaluate)**<br>**CO5-** CO5: Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL6-Create)** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Industrial Visit and Final Presentation and Report | Internships | BL5-Evaluate | 150 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 24 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Major Project – I |
| **Course Code** | CSD0703[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 3 | 3 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Knowledge of programming languages | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Conduct in-depth research and critically analyze existing solutions in the chosen project area within computer science or information technology. (Evaluate) **(BL5-Evaluate)**<br>**CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design) **(BL6-Create)**<br>**CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop) **(BL6-Create)**<br>**CO4-** CO4: Apply project management principles to plan, schedule, track progress, manage resources, and mitigate potential risks throughout the project lifecycle. (Plan and Organize) **(BL4-Analyze)**<br>**CO5-** CO5: Effectively document the project, including system design, implementation details, user manuals, deployment procedures, and future enhancements. (Communicate) **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Project Design Document | PBL | BL5-Evaluate | 50 |
| I | Project Implementation & Testing | PBL | BL6-Create | 50 |
| I | Project Documentation | PBL | BL6-Create | 50 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 24 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Major Project - II |
| **Course Code** | CSD0804[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 10 | 10 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Knowledge of programming languages | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Conduct in-depth research and critically analyze existing solutions in the chosen project area within computer science or information technology. (Evaluate) **(BL5-Evaluate)**<br>**CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design) **(BL6-Create)**<br>**CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop) **(BL6-Create)**<br>**CO4-** CO4: Apply project management principles to plan, schedule, track progress, manage resources, and mitigate potential risks throughout the project lifecycle. (Plan and Organize) **(BL4-Analyze)**<br>**CO5-** CO5: Effectively document the project, including system design, implementation details, user manuals, deployment procedures, and future enhancements. (Communicate) **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Project Design Document | PBL | BL5-Evaluate | 50 |
| I | Project Implementation & Testing | PBL | BL6-Create | 50 |
| I | Project Documentation | PBL | BL6-Create | 50 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 24 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Big Data |
| **Course Code** | CSE0511 [T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic programming is needed to manipulate your data, and java is the base language to start with | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To understand the fundamentals of Big Data.**(BL2-Understand)**<br>**CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)**<br>**CO3-** CO3: To explore tools and practices for big data and Visualization. **(BL3-Apply)**<br>**CO4-** CO4: To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)**<br>**CO5-** CO5: To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)**<br>**CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Big Data: Fundamentals of Big Data, defining big data, building successful big data management architecture, big data journey Big Data Types: Structured and unstructured data types, real time and non-real time requirements. Distributed Computing: History of distributed computing, basics of distributed computing | Lectures with whiteboard/PPT, Recorded video | 6 |
| Unit-2 | Big Data Technology Foundation: Big Data stack, redundant physical infrastructure, security infrastructure, operational databases, organising data services and tools, analytical data warehouse, big data analytics Virtualization: Basics of virtualization, hypervisor, abstraction and virtualization, implementing virtualization with big data Cloud and Big Data: Defining cloud, cloud deployment and delivery models, cloud as an imperative for big data, use the cloud for big data | Lectures with whiteboard/PPT, Recorded video | 10 |
| Unit-3 | Visualization: data visualization, appropriate data visualization technique for given data, design visualizations, dashboard Operational Databases: Relational database, nonrelational database, key-value pair databases, document databases, columnar databases, graph databases, spatial databases MapReduce Fundamentals: Origin of MapReduce, map function, reduce function, putting map and reduce together, optimizing map reduce. | Lectures with whiteboard/PPT, Recorded video | 15 |
| Unit-4 | Hadoop: Discovering Hadoop, Hadoop distributed file system, Hadoop MapReduce, Hadoop file system, dataflow, Hadoop I/O, data integrity, compression, serialization, file-based data structure | Lectures with whiteboard/PPT, Recorded video | 9 |
| Unit-5 | Introduction to Hadoop Ecosystem: Avro - Avro data types and schemas, in-memory serialization and deserialization, avro datafiles, schema resolution Pig-Comparison with databases, pig latin, user defined functions, data processing operators Hive-Running hive, comparison with traditional databases, HiveQL, tables, querying data, user defined functions | Lectures with whiteboard/PPT, Recorded video | 5 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-3 | Assignment | Experiments | BL3-Apply | 2 |
| 1-4 | Quiz | Experiments | BL3-Apply | 1 |
| 1-5 | Practical Assignment | Experiments | BL3-Apply | 25 |
| 1-5 | PBL | PBL | BL6-Create | 35 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Services, E. E. (2015, January 5). Data Science and Big Data Analytics. |
| **Articles** | Research on Big Data – A systematic mapping study:https://www.sciencedirect.com/science/article/abs/pii/S0920548917300211 |
| **References Books** | Holmes, J. (2014, January 10). John Bowlby and Attachment Theory. |
| **MOOC Courses** | |
| **Videos** | Introduction to big data : https://archive.nptel.ac.in/courses/106/104/106104189/ |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | 2 | - | - | 2 | - | - | 1 | - | - |
| CO2 | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | 2 | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | - |
| CO4 | 2 | 1 | - | 2 | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO5 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - |
| CO6 | 1 | - | 1 | - | - | - | - | - | - | - | - | - | 2 | 2 | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Cryptography |
| **Course Code** | CSE0512[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** : Remembering/Revising the basics of computer system, Computer networks and network security**(BL1-Remember)**<br>**CO2-** : Understand the Cryptography and Encryption techniques and the concepts of Hashing **(BL2-Understand)**<br>**CO3-** : Apply the various Symmetric and Asymmetric Key Encryption algorithms**(BL3-Apply)**<br>**CO4-** : Explain the various Encryption and Hashing techniques and analyze the concept of Digital Signatures, IP Security**(BL4-Analyze)**<br>**CO5-** : Evaluating the various methods of Cryptography, Hash functions, Substitution and Transposition techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction and History of Cryptography: Cryptography, History of Cryptography, Mono-Alphabet Substitution, Multi-Alphabet Substitution, Homophonic Substitution, Null Ciphers, Book Ciphers, Rail Fence Ciphers, Vernam Cipher, The Enigma Machine | Lecturing | 8 |
| 2 | Symmetric Cryptography and Hashes: Symmetric Cryptography, Information Theory, Kerckhoffs's Principle, Substitution, Transposition, Binary Math,Block Cipher vs. Stream Cipher, Symmetric Block Cipher Algorithms, Basic Facts of the Feistel Function, S-Box, Data Encryption Standard (DES),Advanced Encryption Standard (AES),International Data Encryption Algorithm (IDEA),Tiny Encryption Algorithm (TEA),Symmetric Algorithm Methods, Symmetric Stream Ciphers ,Hash Function | Lecturing, Experiments | 8 |
| 3 | Number Theory and Asymmetric Cryptography: Asymmetric Cryptography, Basic Number Facts, Birthday Theorem, Random Number Generator , Diffie-Hellman, Rivest Shamir Adleman (RSA), Digital Signature Algorithm, Elliptic Curve, Elgamal, Cramer – Shoup, YAK, Forward Secrecy | Lecturing, Experiments | 8 |
| 4 | Applications of Cryptography: Digital Signatures, Certificate Authority (CA), Registration Authority (RA) , Certificate Authority – Verisign, Certificate Types, Public Key Infrastructure (PKI), Digital Certificate Terminology, Server-based Certificate Digital Certificate Management, Trust Models, Certificates and Web Servers, Microsoft Certificate Services, Windows Certificates: certmgr.msc, Authentication, Kerberos, PGP Certificates, Wi-Fi Encryption, SSL,TLS, Virtual Private Network (VPN), Split Tunneling, VPN Modes, Encrypting Files, BitLocker, Common Cryptography: Mistakes, Steganography, Steganalysis, Unbreakable Encryption | Lecturing, Experiments | 8 |
| 5 | Cryptanalysis, Quantum Computing and Cryptography: Breaking Ciphers, Cryptanalysis, Frequency Analysis, Kasiski, Cracking Modern Cryptography, Linear Cryptanalysis, Differential Cryptanalysis, Integral Cryptanalysis, Cryptanalysis Resources, Cryptanalysis Success Rainbow Tables, Password Cracking Quantum Computing and Cryptography, Timeline, Issues for QC, Two Branches, NIST, Lattice Based Crypto, GGH, NTRU | Lecturing | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-5 | Review Article | Research Paper Presentation | BL4-Analyze | 20 |
| 3-4 | Presentation | PBL | BL3-Apply | 5 |
| 1-5 | Programming Exercise | Experiments | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Stallings, W. (2011). Cryptography and network security principles and practices. Prentice Hall. |
| **Articles** | Forouzan, B. A., & Mukhopadhyay, D. (2011). Cryptography and network security. Tata Mcgraw Hill Education Private Ltd. |
| **References Books** | Kahate, A. (2011). Cryptography and network security. Tata Mcgraw Hill education Private Ltd. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 1 | - | 1 | 1 | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | - | 1 | 2 | - | 3 | - | - | 1 | - | - | - | - | 1 | - | 2 |
| CO3 | - | 1 | - | - | 1 | - | - | 1 | - | - | - | - | 3 | - | 3 |
| CO4 | - | - | - | - | 1 | - | 1 | - | - | - | - | - | 2 | 1 | 2 |
| CO5 | - | 1 | - | - | 2 | 2 | 1 | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Blockchain Technology |
| **Course Code** | CSE0513 [T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Specialization Elective Courses | | | | | | | |
| **Pre-Requisite/s** | Prerequisite: Students must be familiar with Cryptography Techniques, Data Structures and Algorithms, Introduction to Programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember Cryptography Techniques, Data Structures and Algorithms**(BL1-Remember)**<br>**CO2-** To understand the concept and working of blockchain technology, various application areas like cryptocurrency, digital ledger etc. And role of cryptography in blockchain.**(BL2-Understand)**<br>**CO3-** To implement the cryptography and mining to implement blockchain ledger and to implement security.**(BL3-Apply)**<br>**CO4-** To analyze the role of miner sin blockchain. Application of blockchain in multiple areasandhowitprovidessuchaneffectivesecuremechanismofhandlingandmaintainingdataorrecords**(BL4-Analyze)**<br>**CO5-** To evaluate the performance characteristics of blockchain in comparisonto available technologies and what features of blockchain make its oeffective.**(BL5-Evaluate)**<br>**CO6-** To prepare a scenario to observe the performance evaluation of blockchain in comparison to contemporary technologies and to observe the potential application areas**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Basic Cryptography: Fundamentals Principles of Cryptography, Secret Key cryptography, Public Key Cryptography, Hash function, Digital Signature. Distributed Database, Byzantine General problem and Fault Tolerance. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 2 | Introduction Overview of Blockchain, Public vs Private Blockchain, Application of Blockchain, Blockchain Hashing Algorithm, Hash pointe rand Merkle tree, Blockchain Immutable Ledgers, P2P Network, DistributedP2P Network, Blockchain Mining Overview. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 3 | Understanding Blockchain with Cryptocurrency Bitcoin and Block chain, Bitcoin monetary policy, Bitcoin Mining Work, Working with Consensus in Bitcoin, Proof of Work (PoW), Proof of Stack (PoS), Mining Pool, Nonce Range, Timestamp, Mem pool. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 4 | Understanding Blockchain for Enterprises Blockchain: Permissioned model and use cases, Design issues for Permissioned blockchains, Enterprise application of Blockchain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Blockchain, Blockchain enabled Trade | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 5 | Blockchain application development Hyperledger Fabric Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, writing smart contract using Hyperledger Fabric, writing smart contract using Etherem. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Assignment | Experiments | BL2-Understand | 7 |
| 3-4 | Activity | Experiments | BL3-Apply | 8 |
| 1-5 | Project | PBL | BL6-Create | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 18 | 60 | |

Part E

| | |
|---|---|
| **Books** | MelanieSwan BlockChain:BlueprintforaNewEconomy O'Reilly |
| **Articles** | DanielDrescher BlockChainBasics Apress;1stedition |
| **References Books** | ImranBashir Mastering Block Chain: DistributedLedgerTechnology,Decentralization and SmartContractsExplained PacktPublishing |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 2 | 2 | 1 | - | 2 | - | - | - | - | - | - | 2 | 1 | 3 |
| CO2 | - | 1 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | - |
| CO3 | - | 1 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 1 |
| CO4 | - | - | 1 | - | - | 1 | - | - | - | - | - | - | 2 | 1 | 1 |
| CO5 | - | 2 | 2 | - | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 3 |
| CO6 | - | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | 2 | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Introduction to Data Science |
| **Course Code** | CSE0521[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Vocational Courses | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO2-** Understand the importance of and be able to formulate a data analysis problem statement that is clear, concise, and measurable**(BL1-Remember)**<br>**CO3-** Apply appropriate descriptive and inferential methods to summarize data and identify associations and relationships**(BL2-Understand)**<br>**CO4-** Apply appropriate tools and technology to collect, process, transform, summarize, and visualize data**(BL3-Apply)**<br>**CO5-** Analyze Effectively communicate methods and findings in a variety of modes..**(BL4-Analyze)**<br>**CO6-** Analyze categorical and/or numerical data types in a given data set**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of Automata Theory: Basic Concepts of Finite State Systems, Types of Finite Automata: Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NDFA). Finite Automata with ϵ-transition, Transition System, Conversion of NDFA to DFA, Eliminating ϵ-transitions, Minimization of Automata Machines. | Lecturing | 10 |
| 1 | Introduction to Data Science , Evolution of Data Science , Data Science Roles , Stages in a Data Science Project , Applications of Data Science in various fields , Data Security Issues. | Lecture with White Board | 8 |
| 2 | Data Collection Strategies , Data Pre,Processing Overview , Data Cleaning , Data Integration and Transformation , Data Reduction , Data Discretization. | Case Study | 8 |
| 3 | Descriptive Statistics , Mean, Standard Deviation, Skewness and Kurtosis , Box Plots , Pivot Table , Heat Map , Correlation Statistics , ANOVA. | PBL | 8 |
| 4 | Simple and Multiple Regression , Model Evaluation using Visualization , Residual Plot , Distribution Plot , Polynomial Regression and Pipelines , Measures for In,sample Evaluation , Prediction and Decision Making. | PBL | 8 |
| 5 | Generalization Error , Out,of,Sample Evaluation Metrics , Cross Validation , Overfitting , Under Fitting and Model Selection , Prediction by using Ridge Regression , Testing Multiple Parameters by using Grid Search. | PBL | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2 | Case Study | Case Study | BL2-Understand | 1 |
| 3-5 | PBL | PBL | BL3-Apply | 1 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Dietrich, D., Heller, B., & Yang, B. (2013). Data Science and Big Data Analytics. EMC. |
| **Articles** | |
| **References Books** | Pethuru, R. (Ed.). Handbook of Research on Cloud Infrastructures for Big Data Analytics. IGI Global. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 1 | - | - | 1 | - | - | 1 | 1 | 1 | - | - | - |
| CO2 | 1 | - | 1 | - | 1 | - | - | - | 1 | 1 | 1 | - | - | - | - |
| CO3 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 1 | - | - | - |
| CO4 | 1 | 1 | 1 | 1 | 1 | - | 1 | - | 1 | - | 1 | 1 | - | - | - |
| CO5 | 1 | 1 | 1 | - | 1 | - | 1 | - | 1 | - | 1 | 1 | - | 1 | - |
| CO6 | - | - | - | 1 | - | 1 | - | 1 | - | 1 | - | 1 | - | 1 | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Data Mining and Data Warehousing |
| **Course Code** | CSE0522[T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Student should be familiar with Discrete Mathematics, Probability, Statistics, Data structures and basics of RDBMS. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the Data mining techniques that help extract meaningful data.**(BL1-Remember)**<br>**CO2-** To understand the basics of Data warehouse, Data marts, data preprocessing and techniques of data mining.**(BL2-Understand)**<br>**CO3-** To implement the various methods of data mining for data clustering, classification: K-means, K- Medoids etc.**(BL3-Apply)**<br>**CO4-** To analyze the concepts of data Preprocessing, Association Rule Mining, classification, clustering.**(BL4-Analyze)**<br>**CO5-** To evaluate the data mining models that run efficiently.**(BL5-Evaluate)**<br>**CO6-** To create the dominant data mining algorithms; demonstrate an appreciation of the importance of paradigms from the fields of Artificial Intelligence and Machine Learning to data mining; explore the developing areas - web mining, text mining etc. | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Data Mining, its importance, Kind of Data Mined, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining, Data Mining Primitives, Architecture of Data Mining Systems. | Lecturing | 6 |
| 2 | Needs of Data Preprocessing, Data Cleaning, Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. Data Warehouse Concepts: Architecture, Operations, Multidimensional Data Model, Data Warehouse Implementation, Data Cube Technology, Aggregation, OLAP Functions and Tools. | Lecturing , Experiments | 12 |
| 3 | Association Rule Mining, Apriori Algorithm, Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining. | Lecturing , Research | 7 |
| 4 | Classification and Prediction Methods Comparison, Classification by Decision Tree Induction, Bayesian Classification, Classification by Association Rule Analysis. Clusters Analysis: Introduction, Types of Data in Cluster Analysis, Categorization of Major Clustering Methods - Partitioning Methods: K-Means and K-Medoids, Hierarchical Methods: Agglomerative and Divisive Clustering. | Lecturing , Research, PBL | 12 |
| 5 | Applications of Data Mining: Mining Data Streams, Time Series Data, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining World Wide Web, Social Impacts of Data Mining. | Lecturing ,Research | 4 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2-4 | Experiments | Experiments | BL3-Apply | 2 |
| 1-5 | Research Article | PBL | BL4-Analyze | 20 |
| 1-5 | Project based | PBL | | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Han, J., Kamber, M., & Pei, J. (2011, June 9). Data Mining: Concepts and Techniques. |
| **Articles** | |
| **References Books** | Resources, M. A. I. (2012, November 30). Data Mining: Concepts, Methodologies, Tools, and Applications. |
| **MOOC Courses** | |
| **Videos** | Data Mining Introduction: https://www.youtube.com/watch?v=ykZ-_UGcYWgRule Generation:https://archive.nptel.ac.in/courses/106/105/106105174/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | - | 1 | 1 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | - | - |
| CO3 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 | 3 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Cloud Computing |
| **Course Code** | CSE0602[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various technologies for information storage and management.**(BL1-Remember)**<br>**CO2-** To understand the storage techniques, concepts of data center, data center infrastructure management and services. **(BL2-Understand)**<br>**CO3-** To implement the setup of storage techniques such as RAID, LUN Masking at data center. Create the virtual server and virtualize the resources as on demand.**(BL3-Apply)**<br>**CO4-** To analyze the functionality of data center or storage infrastructure as per policies. **(BL4-Analyze)**<br>**CO5-** To evaluate the performance of data center or storage infrastructure on various performance parameters. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG1(No poverty)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG10(Reduced inequalities) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Storage Technology: Data categorization, Data proliferation, Evolution of various storage technologies and architecture, Data Centre- Infrastructure, Key requirements, Managing storage structure, Information Lifecycle Management (ILM)-implementation, Benefits. | Quiz, Report writing | 12 |
| 2 | Storage Systems Architecture: Storage System Components, Disk Drive Components, Disk Drive Performance, Data Protection: RAID-Implementation, levels, RAID-0/1/nested/3/4/5/6 Intelligent Storage System-components, Cache Implementation, Flushing, LUN Masking, Intelligent Storage Array. | Quiz, scenarios can be given to implement on cloud tools, Seminar, Poster | 12 |
| 3 | Introduction to Networked Storage: DAS-Introduction, Benefits and limitations, Introduction to Parallel SCSI, SCSI-3 Architecture, SAN-Evolution, components, FC-connectivity, Fibre Channel Ports. Network-Attached Storage (NAS)-Introduction, components, Implementation, benefits, IP SAN- Components of iSCSI, Topologies for iSCSI Connectivity, Protocol Stack, Discovery, Names, Session. | Quiz, Report writing on most popular applications such as YouTube, Facebook, Instagram, WhatsApp, LinkedIn etc., Seminar, poster | 12 |
| 4 | Introduction to Storage Virtualization: Content-Addressed Storage (CAS) - Types of Archives, Architecture, Features and Benefits of CAS, Object Storage and Retrieval, Storage Virtualization- Forms of Virtualization, Storage Virtualization Configurations, Storage Virtualization Challenges. Big Data Analysis using HADOOP (Map Reduce examples), IR (Information Retrieval) & IE (Information Extraction) Techniques/ Methods and Models. | Abstract of research paper, scenarios to implement on third party cloud environment | 12 |
| 5 | Information Storage on Cloud: Concept of Cloud, vision of cloud computing, cloud computing reference model, Architecture, Services, types of clouds, Economics of the cloud, Characteristics and benefits, Open challenges, Cloud Applications- Scientific applications, Business and consumer applications, Productivity, Social networking. | Quiz, Case writing, seminar | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | G. Somasundaram, Alok Shrivastava (EMC Education Services) Editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.<br>Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi; Mastering Cloud Computing, Elsevier<br>Ulf Troppens; Storage Network Explained: Basic and Application of SAN, NAS; Wiley India. |
| **Articles** | |
| **References Books** | Nick Antonopoulos, Lee Gillam; Cloud Computing: Principles, System & Application, Springer.<br>Anthony T. Velete, Toby J.Velk, Robert Eltenpeter; Cloud Computing: A Practical Approach, Tata McGraw Hill.<br>John W. Rittinghouse, James F. Ransome; Cloud Computing: Implementation, Management and Security, CRC Press - Taylor Francis Publication.<br>Rich Schiesser; IT Systems Management: Designing, Implementing and Managing World-class Infrastructures, PHI Learning. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO2 | 1 | 1 | - | - | 1 | - | 3 | - | - | - | - | 2 | 2 | 2 | 1 |
| CO3 | 1 | 2 | 2 | 2 | 2 | - | 3 | - | - | - | - | 2 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | 2 | 3 | 2 | 2 |
| CO5 | - | 3 | 2 | 2 | 2 | - | 2 | - | 2 | - | - | 2 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Essentials of Digital Forensics |
| **Course Code** | CSE0621[T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | 2 | 0 | 2 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Specific Elective | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of computer architecture, operating system, Computer networks, file system | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To learn basic components, Techniques and principles of Digital forensic analysis and tools used for forensic analysis.**(BL1-Remember)**<br>**CO2-** Understanding the methods and procedures of forensic analysis of various components of the cyber space such as memory forensic, disk forensic, network forensic and web forensic**(BL2-Understand)**<br>**CO3-** Apply forensic investigation process learned in solving a hypothetical/ real case of cybercrime using forensic tools**(BL3-Apply)**<br>**CO4-** Use various forensic tools to analyze the state of disk, network, memory and other artifacts acquired from the victim machine or its environment as well as malware if found. **(BL4-Analyze)**<br>**CO5-** : Evaluating a computer system for digital hygiene against the security policy of an organization / setup.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Understanding the Fundamentals of Computer Forensics, Understanding Different Types of Cybercrimes, Overview of Indicators of Compromise (IoCs), different Types of Digital Evidence and Rules of Evidence, Forensic Readiness Planning and Business Continuity, Roles and Responsibilities of a Forensic Investigator, Legal Compliance in Computer Forensics, Forensic Investigation Process and its Importance, Pre-investigation Phase, Investigation Phase, Post-investigation Phase | Whiteboard, PPT, Programming Labs | 8 |
| 2 | Disk Forensic: Understanding Different Types of Storage Drives and their Characteristics, The Logical Structure of a Disk, Booting Process of Windows, Linux, and Mac Operating Systems, Overview of various File Systems of Windows, Linux, and Mac Operating Systems, Analyzing File Systems using Autopsy and The Sleuth Kit, | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 8 |
| 3 | Data Acquisition: Understanding the Data Acquisition Fundamentals, Types of Data Acquisition, Data Acquisition Format, Understanding the Data Acquisition Methodology, Understanding the Anti-forensics Techniques, Data Deletion and Recycle Bin Forensics, Overview of File Carving Techniques and Ways to Recover Evidence from Deleted Partitions, Password Cracking/ Bypassing Techniques, Detect Steganography, Hidden Data in File System Structures, and Trail Obfuscation, Techniques of Artifact Wiping, Overwritten Data/ Metadata Detection, and Encryption, Overview of Anti-forensics Countermeasures and Anti-forensics Tools | Whiteboard, PPT, Programming Labs | 8 |
| 4 | Memory Forensic: Understanding the Collection Of Volatile and Non-volatile Information, Understanding the Windows Memory and Registry Analysis, How to Examine Cache, Cookie, and History Recorded in Web Browsers, Examine Windows Files and Metadata. Understanding the Volatile and Non- Volatile Data in Linux, Understanding the Memory Forensics using Volatility and PhotoRec, Understanding the Mac Forensics, Network Forensic: Understanding the Network Forensics Fundamentals, Understanding the Logging Fundamentals, Understanding the Event Correlation Concepts, Overview of Identifying Indicators of Compromise (IoCs) from Network Logs, Understanding How to Investigate Network Traffic | Whiteboard, PPT, Programming Labs | 10 |
| 5 | Web Forensic: Understanding the Web Application Forensics, Internet Information Services (IIS) Logs structure , Apache Web Server Logs, Overview of Web Attacks on Windows-based Servers, Detect and Investigate various Attacks on Web Applications, Understanding the Dark Web, Identify the Traces of Tor Browser During Investigation, Tor Browser Forensics, Overview of Collecting and Analyzing Memory Dumps, Understanding the Email System, Components Involved in Email Communication, Parts of an Email Message, Overview of Email Crime Investigation and its Steps, Malware Analysis: Malware and the Common Techniques Attackers Use to Spread Malware, Understanding Malware Forensics Fundamentals and Types of Malware Analysis, Overview of Static Analysis of Malware, Overview of Analysis of Suspicious Word Documents, Understanding Dynamic Malware Analysis Fundamentals and Approaches, Understanding the Analysis of Malware Behavior on System Properties in Real-time, Understanding the Analysis of Malware Behavior on Network in Real-time | Whiteboard, PPT, Programming Labs | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Assignment | Experiments | BL2-Understand | 10 |
| 3-4 | Activity | Experiments | BL3-Apply | 10 |
| 1-5 | Project | PBL | BL4-Analyze | 25 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | EC Council Digital forensic Essentials EC Council |
| **Articles** | Greg Gogolin Digital Forensics Explained 2nd Edition CRC Press |
| **References Books** | Darren Hayes Practical Guide to Digital Forensics Investigations, 2nd Edition Pearson |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| CO2 | - | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 2 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 3 |
| CO5 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | 2 | 2 |
| CO6 | - | 3 | - | 2 | - | - | - | - | - | - | - | - | 1 | 2 | 3 |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Data Analytics & Visualization |
| **Course Code** | CSE0622[P] |

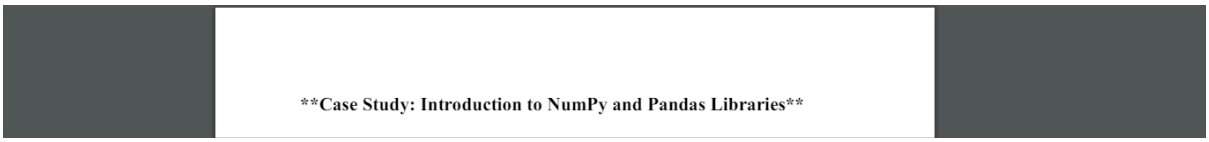
Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 2 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO2-** CO:1 To understand the Basic concept of Data science, application areas and tools required for data science**(BL1-Remember)**<br>**CO3-** CO2: To Explore the functionality of various data science libraries(Numpy, Pandas, Matplotlib etc.) required to process the data.**(BL2-Understand)**<br>**CO4-** CO3: To Apply various data preprocessing methods to make datasets suitable for Data analysis.**(BL3-Apply)**<br>**CO5-** CO4: To Analyze the datasets of different domains using statistical methods & visualization tools.**(BL4-Analyze)**<br>**CO6-** CO5: To Create datasets for real world problems**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Prerequisite: Knowledge of basic python programming. Introduction of Data Science What is Data Science, The Many Paths to Data Science, What Makes Someone a Data Scientist, Advice for New Data Scientists, Applications of Data Science, Tools and techniques for Data Science. | Lecture with White Board | 8 |
| 2 | Introduction to NumPy & Pandas libraries NumPy:Introduction of Numpy, Creating arrays, Array Indexing: Field access, Basic Slicing, Advanced indexing, Basic operations and manipulations, Broadcasting. Pandas: Introduction of Pandas, Pandas Data structures,Series, Dataframe, Built in Functions for basic operations, Reading and Writing Data from csv, text and excel file, Viewing Data using built in functions, Filter Data Frames based on different conditions.. | Case Study | 8 |
| 3 | Data Preprocessing and Analysis Understanding the Domain:Domain Knowledge, Understanding the Dataset, Basic Insights from Datasets. Cleaning and Preparing the Data: Identify and Handle Missing Values, Outliers, Data Wrangling, Encodingcategorical variables, Data Standardization and Normalization, Analyzing and summarizing the Data:Joining, Grouping,Aggregation, Transformation, Filtration, Descriptive Statistics, Correlation , ANOVA. | PBL | 8 |
| 4 | DATA VISUALIZATION -I Introduction to Visualization Tools: Introduction to Data Visualization, Data Visualization using Pandas.Matplotlib of Data Visualization: Introduction to Matplotlib, Basic Plotting with Matplotlib, Line Plots, Area Plots, Histograms, Bar Charts, Pie Charts, Box Plots, Scatter Plots, Bubble Plots.Waffle Charts,Word Clouds, Seaborn and Regression Plots. Creating Maps and Visualizing Geospatial Data: Introduction to Folium, Maps with Markers, Choropleth Maps. | PBL | 8 |
| 5 | DATA VISUALIZATION-II Advanced Visualization Tools:Introduction to Power BI and Tablue,import data set in Power BI, Heat Map, Tree Map, Smart Chart, ColumnChart, Line Chart, Pie, Bar, Area, Scatter Chart, Data Series,Chart Sheet ,Trendline, Error Bars, What-If Analysis. | PBL | 8 |

Part C




Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | VanderPlas, J. Python Data Science Handbook: Essential Tools for Working with Data. O'Reilly Media, Inc. |
| **Articles** | |
| **References Books** | McKinney, W. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython (2nd ed.). O'Reilly Media, Inc. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | - | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 |
| CO2 | - | 1 | - | 1 | 1 | - | 1 | - | 1 | - | 1 | - | - | - | 1 |
| CO3 | 1 | 1 | - | - | 1 | 1 | - | 1 | - | 1 | - | - | - | - | - |
| CO4 | 1 | 1 | - | - | 1 | - | 1 | - | 1 | - | 1 | - | 1 | - | 1 |
| CO5 | - | - | - | - | 1 | 1 | 1 | - | 1 | - | 1 | - | 1 | - | 1 |
| CO6 | - | 1 | - | 1 | - | 1 | - | 1 | - | 1 | - | 1 | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Deep Learning |
| **Course Code** | CSE0711 [T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of machine learning models | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Describe in-depth about theories, fundamentals, and techniques in Deep learnining**(BL1-Remember)**<br>**CO2-** Identify the on-going research in computer vision and multimedia field.**(BL2-Understand)**<br>**CO3-** Evaluate various deep networks using performance parameters.**(BL3-Apply)**<br>**CO4-** Design and validate deep neural network as per requirements.**(BL4-Analyze)**<br>**CO5-** To evaluate the testing performance of deep Learning models on real world dataset**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG5(Gender equality)<br>SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction History of Deep Learning, McCulloch Pitts Neuron, Multilayer Perceptions (MLPs), Representation Power of MLPs, Sigmoid Neurons, Feed Forward Neural Networks, Back propagation, weight initialization methods, Batch Normalization, Representation Learning, GPU implementation, Decomposition – PCA and SVD. Asynchronous Programming | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 10 |
| 2 | Deep Feed forward Neural Networks, Gradient Descent (GD), Momentum Based GD,Nesterov Accelerated GD, Stochastic GD, AdaGrad, Adam, RMSProp, Auto-encoder,Regularization in auto-encoders, Denoising auto-encoders, Sparse auto-encoders, Contractiveauto-encoders,Variational auto-encoder, Auto-encoders relationship with PCA and SVD,Dataset augmentation. Denoising auto encoders, | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 8 |
| 3 | Introduction to Convolutional neural Networks (CNN) and its architectures, CCNterminologies: ReLu activation function, Stride, padding, pooling, convolutions operations,Convolutional kernels, types of layers: Convolutional, pooling, fully connected, VisualizingCNN, CNN examples: LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, RCNNetc.Deep Dream, Deep Art. Regularization: Dropout, drop Connect, unit pruning, stochasticpooling, artificial data, injecting noise in input, early stopping, Limit Number of parameters,Weight decay etc. | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 8 |
| 4 | Introduction to Deep Recurrent Neural Networks and its architectures, Back propagation Through Time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, Gated Recurrent Units (GRUs), Long Short Term Memory (LSTM), Solving the vanishing gradient problem with LSTMs, Encoding and decoding in RNN network, Attention Mechanism, Attention over images, Hierarchical Attention, Directed Graphical Models. Applications of Deep RNN in Image Processing, Natural Language Processing, Speech recognition, Video Analytics. | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 10 |
| 5 | Introduction to Deep Generative Models, Restricted Boltzmann Machines (RBMs),Gibbs Sampling for training RBMs, Deep belief networks, Markov Networks, MarkovChains, Auto-regressive Models: NADE, MADE, PixelRNN, Generative AdversarialNetworks (GANs), Applications of Deep Learning in Object detection, speech/ imagerecognition, video analysis, NLP, medical science etc. | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 10 |

# CSE0711

## Project based Learning Topics

**Medical Imaging Diagnosis:**

- Design a deep learning model for diagnosing medical conditions (e.g., tumors, fractures) from imaging data such as X-rays, MRIs, or CT scans.
- Consider challenges such as data scarcity, interpretability of results, and ethical implications.

**Natural Language Processing (NLP) for Healthcare:**

- Develop a deep learning model to analyze medical texts, such as clinical notes or research papers, for tasks like entity recognition, sentiment analysis, or medical question answering.
- Address issues like domain-specific vocabulary, data privacy, and bias in language.

**Autonomous Vehicles:**

- Create a deep learning system for autonomous driving, focusing on perception tasks like object detection, lane segmentation, and behavior prediction.
- Explore challenges related to real-time processing, robustness to varying environmental conditions, and safety-critical decision-making.

**Fraud Detection in Finance:**

- Build a deep learning model to detect fraudulent transactions in financial data, such as credit card transactions or insurance claims.
- Consider imbalanced datasets, evolving fraud patterns, and the need for explainability in financial decision-making.

**Climate Change Analysis:**

- Develop a deep learning solution for analyzing climate data, including tasks like weather prediction, extreme event detection, and climate impact assessment.
- Address challenges such as data heterogeneity, model uncertainty, and ethical implications of environmental decision-making.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press.<br>Chollet, F. (2021). Deep learning with Python. Manning Publications. |
| **Articles** | |
| **References Books** | Géron, A. (2019). Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. O'Reilly.<br>Müller, A., & Guido, S. (2016). Introduction to Machine Learning with Python: A Guide for Data Scientists. O'Reilly. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | 2 | 3 |
| CO2 | 3 | 1 | - | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | 2 | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Advance web Technology |
| **Course Code** | CSE0712[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Internet and Client Server system is required, Java Script, Dynamic Web Programming | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand CSS syntax and its benefits. Ability to design responsive layouts. Introduction to Bootstrap framework. Understand JavaScript syntax and its inbuilt objects. Learn error handling and event handling in JavaScript. Familiarity with Document Object Model (DOM). Introduction to Asynchronous Programming.**(BL1-Remember)**<br>**CO2-** Gain knowledge of the basics and syntax of AngularJS. Understand the features and advantages of AngularJS. Familiarity with the application structure in AngularJS. Basics of routes and navigation. Understand the Model-View-Controller (MVC) architecture with AngularJS. Introduction to AngularJS services.**(BL2-Understand)**<br>**CO3-** Learn about AngularJS modules and directives. Understand how to configure routes in AngularJS. Gain proficiency in handling forms and validations in AngularJS. Understand data binding concepts. Ability to create single-page websites using AngularJS.**(BL3-Apply)**<br>**CO4-** Set up the Node.js environment. Understand the Node Package Manager (NPM). Familiarity with Node.js features. Introduction to the Console Object. Conceptual understanding of Callbacks in Node.js.**(BL2-Understand)**<br>**CO5-** Understand events and the event loop in Node.js. Learn about timers and error handling mechanisms. Gain proficiency in working with buffers and streams. Ability to work with the file system in Node.js. Understand networking concepts with Node.js (TCP, UDP, HTTP clients, and servers). Introduction to the Web Module. Learn debugging techniques in Node.js. Ability to create REST APIs in Node.js. Understand sessions and cookies handling. Introduction to design patterns, caching, and scalability concepts in Node.js.**(BL3-Apply)** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Refreshing Java Script and CSS CSS syntax, benefits, Responsive design, Bootstrap introduction, Java script syntax, Java script inbuilt objects, Error handling and event handling, DOM, Asynchronous Programming | Lectures with PPT | 10 |
| 2 | Introduction to Angular JS Basics and Syntax of Angular JS, Features, Advantages, Application Structure, Basics of routes and navigation, MVC with Angular JS, Services | Experiments | 8 |
| 3 | Angular JS in Details Modules, Directives, Routes, Angular JS Forms and Validations, Data binding, Creating single page website using Angular JS | Group Discussion | 9 |
| 4 | Introduction to Node JS Setup Node JS Environment, Package Manager, Features, Console Object, Concept of Callbacks Events and Event Loop, timers, Error Handling, Buffers, Streams, Work with File System, Networking with Node (TCP, UDP and HTTP clients and servers), Web Module, Debugging, Node JS REST API, Sessions and Cookies, Design patterns, caching, scalability | PBL | 10 |
| 5 | Database Programming with Node JS and MongoDB Basics of MongoDB, Data types, Connect Node JS with MongoDB, Operations on data (Insert, Find, Query, Sort, Delete, Update) using Node JS | Case Study | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Assignment | Experiments | BL2-Understand | 10 |
| 2-3 | Quiz | Experiments | BL3-Apply | 6 |
| 1-5 | Develop a mini project using HTML5, CSS3, JavaScript, Angular JS, PHP. | PBL | BL5-Evaluate | 28 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Nixon, R. (Year). Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites. Publisher. |
| **Articles** | |
| **References Books** | HTML5 Black Book (TextBook) DT Editorial Services. 2. Developing Web Applications Ralph Moseley - Wiley India 3. Web Technologies Black Book dreamtech press 4. Developing web applications in PHP and AJAX Harwani Tata McGrawHill |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | - | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO3 | 2 | 1 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Full Stack Development |
| **Course Code** | CSE0713{T} |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | To become knowledgeable about the most recent web development technologies and learn core concept of both front end and back end programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember about the front end and back end Tools.**(BL1-Remember)**<br>**CO2-** To understand the basics of web architecture, find and use code packages based on their documentation to produce working results in a project**(BL2-Understand)**<br>**CO3-** Implementation of web application employing efficient database access. **(BL3-Apply)**<br>**CO4-** Create web pages that function using external data and analyze them.**(BL4-Analyze)**<br>**CO5-** To develop a fully functioning website and deploy on a web server.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG5(Gender equality)<br>SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git &Github HTML, CSS | Lecturing | 10 |
| 2 | Frontend Development: Javascript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format. | Lecturing & Experiments | 8 |
| 3 | REACT JS: Introduction to React React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication | Lecturing & Experiments | 9 |
| 4 | Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring RESTful API using Spring Framework Building an application usingMaven | Lecturing & Experiments | 10 |
| 5 | Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles and deploying application in Cloud | Lecturing & Experiments | 9 |

Part C

This plugin is not supported

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Duckett, J. (2014). Web Design with HTML, CSS, JavaScript and JQuery Set. Wiley.<br>Nixon, R. (Year). Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites. O'Reilly Media. |
| **Articles** | |
| **References Books** | Bush, E. (2016). Full-Stack JavaScript Development. Red Sky Productions LLC.<br>Dyl, T., Przeorski, K., & Czarnecki, M. (2017). Mastering Full Stack React Web Development. Packt Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | - | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO3 | 2 | 1 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Programming in C |
| **Course Code** | CSL0102[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 2 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Windows/Linux operating system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember the Basic Organization of a Computer and basic concept of programming language (Knowledge, Understand)**(BL1-Remember)**<br>**CO2-** Apply and analyze the basic concept of Conditional Statements, Loops & Array. (Apply, Analyze).**(BL2-Understand)**<br>**CO3-** Apply and analyze the basic concept of Pointer & Functions. (Apply, Analyze).**(BL3-Apply)**<br>**CO4-** Apply and analyze the basic concept of Structure and Union &Dynamic Memory Management. (Apply, Analyze).**(BL3-Apply)**<br>**CO5-** Understand the File Management system, Command Line Arguments and Preprocessor Introduction (Knowledge, Understand)**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Unit-I Basic Organization of a Computer, Number System History and needs of programming language (PL).Types of PL, Characteristics of programming language, Syntax, Semantics ,Programmatic analysis , Need for logical analysis and thinking Algorithm, Pseudo code, Flow Chart. Introduction: Character set, variables and identifiers, built-in data types, arithmetic operators and expressions, constants and literals, simple assignment statements, basic input/output statements, simple 'C' programs. | Lecturing | 6 |
| 2 | Conditional Statements and Loops: Decision making within a program, conditions, relational operators, logical connectives, if statement, if-else statement; Loops: while loop, do-while loop, for loop; nested loops, infinite loops; switch statement, structured programming. Array: One Dimensional Arrays - array manipulation, searching, insertion and deletion in an array; Two Dimensional Arrays - addition/multiplication of two matrices, transpose of a square matrix; string | Lecturing Experiments | 6 |
| 3 | Pointer: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays, dynamic memory allocation. Functions: Standard library functions, prototype of a function, return type, function calling, block structure, passing arguments to a function - call by reference and call by value; recursive functions, arrays as function arguments. | Lecturing Experiments | 6 |
| 4 | Structure and Union: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays - arrays of structure, structures containing arrays, unions. Dynamic Memory Management: Use of malloc, calloc, realloc and free keywords. | Lecturing Experiments | 6 |
| 5 | File Management: Introduction, defining and opening a file, closing a file, input/output operations on files, error handling during i/o operations, random access to files, programs using files. Command Line Arguments: argv and argc arguments, programs using command line arguments. Preprocessor: Introduction, macro substitution, file inclusion, compiler control directives. | Lecturing Experiments | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiments | Experiments | Experiments | BL3-Apply | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | B. W. Kernighan, Dennis M. Ritchi; The C Programming Language; Prentice Hall. Programming Languages: Concepts and Constructs by Ravi Sethi, Pearson Education. |
| **Articles** | |
| **References Books** | Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill E. Balagurusamy; Programming in ANSI C; TataMcGraw-Hill Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO3 | - | - | 1 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO4 | - | - | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Object Oriented Programming using Java |
| **Course Code** | CSL0202[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 2 | 4 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of any one programming language such as C/C++ | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax rules of java programming**(BL1-Remember)**<br>**CO2-** To understand various Object-Oriented Concepts Exception handling, Multithreading, networking, and database connectivity techniques**(BL2-Understand)**<br>**CO3-** To implement java AWT and applet and for GUI Programming and Event handling, java IO for Input and output handling, jdbc for database connectivity**(BL3-Apply)**<br>**CO4-** To analyze various Error, and Database Handling techniques to learn how to improve the performance of the java application.**(BL4-Analyze)**<br>**CO5-** To evaluate and compare the performance of various application Development techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of java: Introduction to JAVA History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; JVM and JRE;A simple program, its compilation and execution; the concept of path and class path: Java Basics: Data types; Operators- precedence and associatively; Type conversion; decision making controls – if, if ..else, switch; loops – for, while, do...while; advanced for loop. Special statements–return, break, continue Modular programming: methods and method overloading, memory allocation and garbage collection, static and volatile keyword | Lecturing, Experiments | 5 |
| 2 | Object Oriented Programming in Java: Class fundamentals, java Packages, Access specifies, Constructors; Copy constructor; this pointer; finalize() method, array and String, mutable and immutable; String Buffer and String Builder; Java Inheritance: Inheritance basics, method overriding, polymorphism static and dynamic polymorphism Abstract Class & Interfaces: abstract classes, uses of abstract classes implementation of abstract class, defining an interface, implementing & applying interfaces, extending interfaces | Lecturing, Experiments | 10 |
| 3 | Exception Handling; understanding Exception and its classes; class. hierarchy for Throwable, call stack mechanism, checked and unchecked Exception. Try, catch and finally block, throw and throws clause. Multithreading: Basic idea of a Thread, differences between process and Thread, multithreaded programming; different states of a Active thread, The lifecycle of a thread; Creating thread with the thread class and runnable interface, thread constructor and thread methods; Thread synchronization; Thread scheduling; Producer consumer relationship; Daemon thread, Selfish threads, interthread communication. | Lecturing, Experiments | 10 |
| 4 | Java AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, menu and Choice menu, Text area, Frame; Layout managers. Java Applets: Introduction of java Applet, Life cycle of applet; HTML Tags for applet. Java Event Handling Model: Java's event delegation model – ignoring the event, Self-contained events, Delegating events; The event class hierarchy; The relationship between interface, methods called, parameters and event source, Event listeners: Action Listener, Mouse Listener, Key Listener | Lecturing, Experiments | 10 |
| 5 | Collection Framework: Introduction to collections framework, collection interfaces, collection classes. JAVA Database Connectivity (JDBC): JDBC Drivers, Connection Interface, Result set types of Result Set, applying insert, delete, display and update operation JDBC with java AWT. | Lecturing, Experiments | 10 |

M

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-5 | PBL | PBL | BL5-Evaluate | 45 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 20 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Naughton, P. & Schildt, H. (2002). The Complete Reference Java 2. Tata McGraw Hill. |
| **Articles** | |
| **References Books** | Horstmann, C. S., & Cornell, G. (2008). Core Java 2 (Vol. I & II). Sun Microsystems.<br>Deitel, P. J. (2017). Java- How to Program. Pearson Education, Asia. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | 2 | 1 |
| CO2 | 1 | 2 | 1 | 1 | 2 | 2 | - | - | - | 3 | - | - | 2 | 3 | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | 1 | - | - | 3 | 2 | 3 |
| CO4 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Data Structures |
| **Course Code** | CSL0302[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of computer fundamentals and programming in 'C'. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understanding: comprehensive knowledge of the data structures;**(BL2-Understand)**<br>**CO2-** Applying: understand the importance of data and be able to identify the data requirements for an application;**(BL3-Apply)**<br>**CO3-** Analyzing: have a practical experience of algorithmic design and implementation;**(BL4-Analyze)**<br>**CO4-** Evaluating: practical experience of developing applications that utilize data structures and evaluating the performances of applications;**(BL5-Evaluate)**<br>**CO5-** Creating: develop projects requiring the implementation of various data structures**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Data Structures, Arrays: Linear Array, Operations on Linear Array, Multidimensional Array, Sparse Matrices; Strings; Linked List: Operations on Linked List, Garbage Collection, Header Linked List, Two-Way Linked List, Circular Linked List. | Lecturing, Experiments | 7 |
| 2 | Stacks: Implementation of Stacks using Arrays and Linked Lists, Polish Notations, Conversion from Infix to Postfix, Evaluation of Postfix Expressions; Queues: Representation of Queues, Implementation of Queues using Arrays and Linked Lists, Circular Queue, De-Queue, Priority Queues, Recursion, Tower of Hanoi problem. | Lecturing, Experiments | 7 |
| 3 | Trees: Definition, Terminology; Binary Trees: Representation in Memory, Traversing Binary Tree, Extended Binary Tree, Threaded Binary Trees, Operations on Binary Trees; Search Trees: Operations on Search Trees. | Lecturing, Experiments | 7 |
| 4 | Graphs: Terminology, Representation of Graphs, Directed Graphs, Directed Acyclic Graph, Shortest Path Algorithms, Graph Traversal; Minimum Cost Spanning Tree: Kruskal's Algorithm, Prim's Algorithm. | Lecturing, Experiments | 7 |
| 5 | Internal and External sorting: Bubble Sort, Heap Sort, Radix sort, Selection sort, Insertion sort and Quick Sort; Searching: Linear Search, Binary Search. File Structures, Random Access Files, Indexed Sequential Files, B Trees and B+ Trees; Hash Tables, Hashing Functions, Collision Resolution Strategies. | Lecturing, Experiments | 7 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Assignment | Case Study | BL3-Apply | 3 |
| 3-4 | Quiz | PBL | BL2-Understand | 1 |
| 5 | Assignment | PBL | BL4-Analyze | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Lipschutz, S. (2018). Schaum's Outline of Linear Algebra. McGraw-Hill.<br>Kruse, R. L., Ryba, A. J., & Leung, B. P. (2006). Data Structures and Program Design in C. |
| **Articles** | |
| **References Books** | Horowitz, E., Sahni, S., & Anderson-Freed, S. (1981). Fundamentals of Data Structures in C. Publisher.<br>reTmbley, J. P., & Sorenson, P. G. (2014). An Introduction to Data Structures with Applications. |
| **MOOC Courses** | |
| **Videos** | . |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO2 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 1 |
| CO3 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO4 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO5 | 2 | 1 | - | - | - | - | - | - | 2 | - | - | 2 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Software Engineering |
| **Course Code** | CSL0303[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | student must have knowledge about basic data structures , computer organization & programming language concepts. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the basics of software engineering like characteristic, crisis of software and process of software engineering systems (Knowledge, Understand)**(BL2-Understand)**<br>**CO2-** Apply the various SDLC, ER, DFD models, to collect SRS, And understand the software. (Apply).**(BL3-Apply)**<br>**CO3-** Design the Design Strategies, Architectural Design concept for better development of software (Design).**(BL6-Create)**<br>**CO4-** Explain various testing techniques and Analyze the concept of testing strategies (Analysis)**(BL4-Analyze)**<br>**CO5-** Evaluating the need of Software Maintenance and Software Project Management Software, Need for Maintenance, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering and other inter process communication tech An Overview of CASE Tools, Constructive Cost Models (COCOMO), Software Risk Analysis and Management. (Investigation).**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✓<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models. | Lecturing | 6 |
| Unit-2 | Planning: Software Requirement Specifications (SRS) Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Model. | Case Study | 6 |
| Unit-3 | Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Function Point (FP) Based Measures, Cyclomatic Complexity. | Case Study | 6 |
| Unit-4 | Testing: Software Testing, Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards. | Case Study | 6 |
| Unit-5 | Maintenance: Software Maintenance and Software Project Management Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management, An Overview of CASE Tools, Constructive Cost Models (COCOMO), Software Risk Analysis and Management. | Lecturing | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2,3,4 | Case study | Case Study | BL5-Evaluate | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 12 | 60 | 18 |

Part E

| | |
|---|---|
| **Books** | Pressman, R. S., & Dr, B. R. M. (2014, January 23). Software Engineering: A Practitioner's Approach. McGraw-Hill Education. http://books.google.ie/books?id=i8NmnAEACAAJ&dq=R.+S.+Pressman&hl=&cd=1&source=gbs_api (Pressman & Dr, 2014) |
| **Articles** | |
| **References Books** | Pressman, R. S., & Dr, B. R. M. (2014, January 23). Software Engineering: A Practitioner's Approach. McGraw-Hill Education. http://books.google.ie/books?id=i8NmnAEACAAJ&dq=R.+S.+Pressman&hl=&cd=1&source=gbs_api (Pressman & Dr, 2014) |
| **MOOC Courses** | |
| **Videos** | https://onlinecourses.nptel.ac.in/noc20_cs68/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 2 |
| CO2 | 1 | - | - | - | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 3 |
| CO3 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO6 | 1 | 1 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | - | 3 | 3 | 3 |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Database Management System |
| **Course Code** | CSL0403[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Student should be aware of the functioning of Application software and how information technology helps in providing information by processing Data. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand basic concepts of query writing, and transaction management and identify various data models (ER modeling concepts) for designing a good database **(BL1-Remember)**<br>**CO2-** Apply relational database theory and describe relational algebra expression, tuple, and domain relation expression for writing queries in relational algebra and SQL.**(BL2-Understand)**<br>**CO3-** Analyze the quality of the database using normalization techniques, conflict scenarios using concurrent processing techniques, and analyze various transaction serialization scenarios**(BL3-Apply)**<br>**CO4-** Evaluate and improve the database design by applying normalization, key constraints, and other constraints.**(BL4-Analyze)**<br>**CO5-** Design a real database application using Database Management approaches**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| UNIT 1 | Introduction- Introduction to the Databases, Database definitions, Databases and Traditional File Processing, Systems, Advantages of Databases, Functions of DBMS, Data Models, Types of data models. Database Architecture and Client/server architecture. Relational Data Model. E-R Model: Basic Concepts, Design Issues, Mapping Constraints, Keys, E-R Diagram, Weak Entity set, Extended E-R features, Design of an E-R Database Schema, Reduction of an E-R schema to Tables. | LECTURE | 10 |
| UNIT 2 | Relational Model: Structure of Relational Database, The Relational Algebra, the tuple relational calculus, The Domain Relational Calculus, Views SQL- Background, Basic Structure, SET operations, Aggregate functions, Null Values, Nested Sub queries, Derived Relations, Views, Modification of Database, Joined Relations, DDL, Other SQL features. | EXPERT LECTURE | 10 |
| UNIT 3 | Relational Database Design-, Functional Dependency. Normalization: First Normal Form, second normal form, Third normal form, Boyce – Codd normal form, Normalization Using Multi valued Dependencies, Normalization Using Join Dependencies, Domain- Key Normal Form and Alternative Approaches to Database Design. | ROLE PLAY | 5 |
| UNIT 4 | Transaction- Transaction Concepts, State, ACID properties, Implementations of Atomicity and durability, Concurrent Executions, Serializability, Recoverability, Transaction Definition in SQL. | GROUP DISCUSS | 10 |
| UNIT 5 | Concurrency Control- Lock based protocol, Time-stamp based protocol, Validation based protocol, Multiple Granularity, Multi version Schemes, Deadlock Handing, Insert and Delete operations, Concurrency in index structure Query Optimization. | LECTURE | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| UNIT 1 AND UNIT 2 | PBL | PBL | BL4-Analyze | 45 |
| UNIT 3 AND UNIT 4 | EXPERIMENTS | Experiments | BL2-Understand | 20 |
| UNIT 5 | CASE STUDY | PBL | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Silberschatz, A., Korth, H. F., & Sudarshan, S. (2001, July 1). Database Systems Concepts with Oracle CD. McGraw-Hill Science, Engineering & Mathematics. |
| **Articles** | |
| **References Books** | Elmasri, R., & Navathe, S. (2011, January 1). Fundamentals of Database Systems. Addison Wesley Longman. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | | - | - | 2 | - | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 3 | 3 | 1 | 2 | 2 | - | - | - | - | 3 | - | - | 2 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Computer System Organization |
| **Course Code** | CSL0404[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Digital Logics, Basic Computer Architecture, Number system | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the basics of computer system and its architecture with architecture of 16-bit microprocessor**(BL2-Understand)**<br>**CO2-** Apply the concepts learned in designing of memory and other sequential circuits.**(BL3-Apply)**<br>**CO3-** Analyze the concept of designing of hardware logics that makes a computer system functional**(BL4-Analyze)**<br>**CO4-** Evaluating the working and performance of the implemented hardware and comment on its efficiency**(BL5-Evaluate)**<br>**CO5-** Create and design various hardware and software logics to make a computer system like ALU, Memory, Bus, etc**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Computer Organization: History and overview of Microprocessor, Architecture of an 8086 Microprocessor: Pin diagram, block diagram, Register Transfer Language and Micro-operations: Register transfer language, conditional data transfer, system bus, bus and memory transfer, Design of Arithmetic Unit, Logic Unit & shift Unit for arithmetic, logical and shift operations, Design of combine Arithmetic, Logic and shift Unit. | Lecturing with Board/PPT, Experiment using Logisim simulator | 12 |
| 2 | Data Representation: fixed and floating-point Representations.. Computer Arithmetic: Hardware and software Implementation of Arithmetic Unit for common arithmetic operations: Addition, Subtraction, Multiplication and Division (Fixed point and Floating point) Decimal arithmetic unit and Decimal Arithmetic operations, Booth Algorithm Floating point IEEE standards. | Lecturing with Board/PPT, Experiment using Logisim simulator | 10 |
| 3 | Central Processing Unit organization: General Register Organization, Stack organization, Instruction formats, Instruction Set and Instruction Execution Cycle, Addressing modes, CISC and RISC processors Data Transfer Modes: Programmed I/O, Interrupt driven I/O, Priority Interrupt, DMA (Direct Memory Access), I/O Processor. | Lecturing with Board/PPT | 9 |
| 4 | Memory Organization: Memory Hierarchy, Secondary Memory, Main Memory Organization: Random access memory (RAM), Read Only memory (ROM), Building large memories using small RAM and ROM chips, Performance analysis. Associative Memory: Hardware Organization, Match logic, Cache memory, Address mapping, writing into cache. | Lecturing with Board/PPT | 8 |
| 5 | Pipeline and Parallel Processing: Pipelining, arithmetic pipeline, instruction pipeline, RISC pipelines, Parallel Processing, Vector processing and array processor: Attached array processor, SIMD array Processor. | Lecturing with Board/PPT | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Design an 8 bit Arithmetic Unit using Logisim Simulator | PBL | BL6-Create | 05 |
| 1 | Design an 8 bit Combined Arithmetic, Logic and shift Unit using Logisim Simulator | PBL | BL6-Create | 05 |
| 2 | Design a circuit for implementation of Booth Multiplication algorithm using Logisim Simlulator | PBL | BL6-Create | 05 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Morris Mano, M. (2007). Computer System Architecture. 3rd ed. Pearson Education.Ray, A.K. and Bhurchandi, K.M.(2017). Advanced Microprocessors and Peripherals. 3rd ed.McGraw Hill Education. |
| **Articles** | |
| **References Books** | S. Tanenbaum, Andrew(2021).Structured Computer Organization.6th ed.Pearson Education.Hall, V. Douglas(2017). Microprocessor and Interfacing.3rd ed. McGraw Hill Education. Stallings, William.(2016). Computer Organization and Architecture.10th ed.Pearson Education. |
| **MOOC Courses** | Dr. Santosh Biswas, Prof. Jatindra Kumar Deka, Prof. Arnab sarkar.(2021). Computer Organization and Architecture: A Pedagogical Aspect, IIT Guwahati. https://nptel.ac.in/courses/106103180 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | - | 2 | 1 | 2 |
| CO2 | 1 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO3 | 2 | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO4 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO5 | 2 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Artificial Intelligence |
| **Course Code** | CSL0501[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Statistical Data Analysis and visualization methods, and Python Programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember**(BL1-Remember)**<br>**CO2-** understand**(BL2-Understand)**<br>**CO3-** Analyze**(BL4-Analyze)**<br>**CO4-** Evaluate**(BL5-Evaluate)**<br>**CO5-** Create**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1: | Introduction to AI What is AI, Turing test, cognitive modelling approach, law of thoughts, the relational agent approach, the underlying assumptions about intelligence, techniques required to solve AI problems, level of details required to model human intelligence, successfully building an intelligent problem, history of AI | Lecturing | 9 |
| Unit 2 : | AI Systems and Techniques: Reasoning agents, Logic and inference via Logic Programming, Linked data, semantic net and internet search, planning under uncertainty, Adversarial search, game playing, Probabilistic inference, Natural language processing, approaches to machine translation. | Lecturing | 9 |
| Unit 3 : | AI Research Trends: Research trends in machine learning, deep learning, reinforcement learning, robotics, computer vision, natural language processing, collaborative systems, algorithmic game theory, internet of things (IoT), neuromorphic computing. Applications of AI by domain: Transportation, home/service robots, healthcare, education, lower source communities, public safety and security, employment and workplace, entertainment, finance, baking and insurance. | Case Study | 9 |
| Unit 4 | Role of Artificial Intelligence in Society: Societal challenges AI presents, Ethical and Societal implications, policy and law for AI, fostering dialogue, sharing of best practices. Malicious Use of AI: Prevention and Mitigation: Security relevant properties of AI, Security domains and scenarios: digital security, physical security, pollical security, factors affecting the equilibrium of AI and security Explainable AI: Introduction to explainable AI, why explainable AI, interpretability and explain ability, methods of interpretability and explain ability. | Case Study | 9 |
| Unit 5 | Introduction to Data Analytics: Working with Formula and Functions, Introduction to Charts, Logical functions using Excel, Analyzing Data with Excel. | Lecturing PBL | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Unit - I-V | PBL | PBL | BL6-Create | 10 |
| Unit -III - IV | Case Study | Case Study | BL4-Analyze | 10 |
| Unit II & V | Implement search algorithm of AI Develop an intelligent game using python Design a intelligent lock using python Elementary programs using LISP. Write a program to predict sales trends . Elementary program using prolog Write a program to design a NLP base user interface. Write a program to convert text to voice vice – versa. Apply and create formulas on excel sheet. Analyze the data using excel Visualize data in Excel using various types of charts. | Experiments | BL3-Apply | 10 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Patterson, D. W. (1990, January 1). Introduction to Artificial Intelligence and Expert Systems. |
| **Articles** | |
| **References Books** | Rich, E., & Knight, K. (1991, January 1). Artificial Intelligence. McGraw-Hill Science, Engineering & Mathematics. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 1 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 2 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO4 | - | 2 | - | 3 | 1 | - | - | - | - | 1 | - | - | 2 | 3 | 3 |
| CO5 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Design and Analysis of Algorithm |
| **Course Code** | CSL0503[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of data, Information, Data Structures, Algorithms, and Algorithm Complexity | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concepts of data structures and algorithms.**(BL1-Remember)**<br>**CO2-** To understand Basic concepts of algorithm representation techniques such as Pseudo codes and Flowcharts and analysis of the algorithm**(BL2-Understand)**<br>**CO3-** To solve various algorithmic problems using different techniques.**(BL3-Apply)**<br>**CO4-** To compare various types of algorithmic approaches used to solve a problem.**(BL4-Analyze)**<br>**CO5-** To select the correct algorithm for correct problem.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Overview of Data Structures – Array, Stack, Queue, Link List, Algorithms, Analysis of Algorithms, Growth of Functions, Recurrences (Substitution & Master method). Heap Sort. | Lecturing | 10 |
| 2 | Divide and Conquer: Binary Search, Merge Sort, Maximum and Minimum Problem, Strassen's Matrix Multiplication. Greedy Algorithms: Optimal Merge pattern, Huffman Codes, Fractional Knapsack Problem, Tree Vertex Splitting Problem, Minimum Spanning Tree. | Lecturing | 10 |
| 3 | Dynamic Programming: Principal of Optimality, Multistage Graph, 0/1 Knapsack Problem, Optimal Binary Search Tree, Reliability Design | Lecturing | 8 |
| 4 | Back Tracking: N-Queen's Problem, Hamiltonian Cycle, and Graph Coloring. Branch and Bound: LC branch and bound, 15-puzzle problem, Traveling Salesman Problem | Lecturing, PBL | 8 |
| 5 | Binary Trees: Binary Search Tree, In order, Pre order, Post order. Graph Traversal (BFS and DFS), B – Tree Introduction to NP Completeness: The class P and NP, NP Completeness Problems, NP Hard Problems. | Lecturing | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | PBL | PBL | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 0 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Horowitz, E., & Sahni, S. (1978, January 1). Fundamentals of Computer Algorithms. Computer Science Press. |
| **Articles** | |
| **References Books** | Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009, July 31). Introduction to Algorithms, third edition. MIT Press. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 2 | 2 | 1 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO3 | 2 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO4 | 1 | 2 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Machine learning |
| **Course Code** | CSL0701[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Statistical Data Analysis and visualization methods, and Python Programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To understand Basic concept of machine learning, various machine learning models**(BL1-Remember)**<br>**CO2-** To understand various Performance evaluation techniques of Machine Learning models. **(BL2-Understand)**<br>**CO3-** To implement various supervised, unsupervised and reinforcement machine Learning Models **(BL3-Apply)**<br>**CO4-** To train & test various machine Learning models using different domains of dataset. **(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the performance of various machine learning models using statistical & visualization tools**(BL5-Evaluate)**<br>**CO6-** To create machine learning models to solve real world problems.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of Machine Learning: What is Machine Learning, Need for Machine Learning, Why & When to Make Machines Learn?, Machine Learning Model, Challenges in Machines Learning, Applications of Machines Learning, Overview of various machine Learning Algorithms, Performance evaluation measures for machine learning algorithms, the curse of dimensionality, Data Feature Selection, Training Data vs. Validation Data vs. Test Data for ML Algorithms, bias-variance trade off, over fitting vs under fitting. | Lectures with PPT, Experiments | 9 |
| 2 | Supervised Learning-I Regression: Introduction to Regression, Types of Regression Models, Introduction to Linear Regression, Simple Linear Regression, Least square regression, Gradient Descent , Multiple Linear Regression (MLR), Regularization in Linear Regression, Ridge regression, Lasso regression, Polynomial Regression, Support Vector for Regression (SVR). | Lectures with PPT, Experiments | 10 |
| 3 | Supervised Learning-II Classification – Introduction to Classification, Types of Learners in Classification, Logistic Regression, K-Nearest Neighbors (K-NN), Support Vector Machine (SVM), Kernel SVM, Naive Bayes, Decision Tree Classification, Random Forest Classification. | Lectures with PPT, Experiments | 9 |
| 4 | Unsupervised Learning Clustering- Introduction to Clustering, Types of Clustering, Types of Clustering Algorithms, K-Means Clustering, Hierarchical Clustering, DBSCAN Clustering, Association Rule Learning: Introduction to Association Rule Learning, Types of Association Rule Learning, Apriori Algorithm, Eclat Algorithm, F-P Growth Algorithm, Applications of Association Rule Learning. | Lectures with PPT, Experiments | 9 |
| 5 | Reinforcement Learning: Introduction of Reinforcement Learning, Terms used in Reinforcement Learning, Key Features, Elements of Reinforcement Learning, How does Reinforcement Learning Work?, The Bellman Equation, Types of Reinforcement learning, Markov Decision Process, Reinforcement Learning Algorithms, Reinforcement Learning Applications Performance Improvement of ML Models: Performance Improvement with Ensembles, Ensemble Learning Methods, Bagging Ensemble Algorithms, Boosting Ensemble Algorithms, Voting Ensemble Algorithms. | Lectures with PPT, Experiments | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Implementation of various performance evaluation techniques of machine learning | Experiments | BL3-Apply | 02 |
| 2 | Implementation of various regression models of machine learning | Experiments | BL3-Apply | 04 |
| 3 | Implementation of various classification models of machine learning | Experiments | BL3-Apply | 03 |
| 4 | Implementation of various clustering models of machine learning | Experiments | BL3-Apply | 03 |
| 5 | Implementation of RL, bagging and boosting models of machine learning | Experiments | BL3-Apply | 03 |
| 1-5 | Problem Based Learning based on real world problems | PBL | BL6-Create | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Andreas C. Müller, Sarah Guido.(2016).Introduction to Machine Learning with Python: A Guide for Data Scientists.1st ed.O'Reilly Media. |
| **Articles** | |
| **References Books** | Tom M. Mitchell.(2017).Machine Learning.1st ed.McGraw Hill Education.<br>Dr S. Sridhar, Dr M. Vijayalakshmi.(2021).Machine Learning.1st ed. Oxford University Press.<br>Manaranjan Pradhan, U Dinesh Kumar.(2019).Machine Learning using Python.1st ed. Wiley India. |
| **MOOC Courses** | Prof. S. Sarkar.(2023).Introduction to Machine Learning, IIT Kharagpur.https://nptel.ac.in/courses/106105152<br>Dr. Balaraman Ravindran.(2024).Introduction to Machine Learning, IIT Madras.https://nptel.ac.in/courses/106106139 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | 2 | 3 |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Software Project Management |
| **Course Code** | CSL0801[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Prerequisite: basics of software engineering, Software Development models, and Testing strategies etc. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To remember the concepts of Software Engineering, Software Project Management, project planning, needs, vision and scope.**(BL1-Remember)**<br>**CO2-** CO2: To understand the Basic concept of project management, Dimensions of Project Monitoring and Control. **(BL2-Understand)**<br>**CO3-** CO3: To apply various project management concepts, work breakdown structure and its life cycle and Scheduling methods**(BL3-Apply)**<br>**CO4-** CO4: To analyze the various dimensions of Project Monitoring and Control, Error tracking and testing approaches.**(BL4-Analyze)**<br>**CO5-** CO5: To evaluate the performance of various scheduling techniques and testing techniques. CO6: To create various scheduling and monitoring diagrams and their applications to solve real world problems.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process. | Lectures with whiteboard/PPT, case study | 13 |
| Unit-2 | Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts. | Lectures with whiteboard/PPT, case study | 12 |
| Unit-3 | Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Desk checks, Walkthroughs, Code Reviews, Pair Programming. | Lectures with whiteboard/PPT, case study | 13 |
| Unit-4 | Testing Objectives, Testing Principles(, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process | Lectures with whiteboard/PPT, case study | 12 |
| Unit-5 | Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project | Lectures with whiteboard/PPT, case study | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I-V | Case Based Activity | Case Study | BL3-Apply | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Cotterell, M. Software Project Management. Tata McGraw-Hill. |
| **Articles** | |
| **References Books** | Royce, W. Software Project Management. Pearson Education. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO2 | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | 2 |
| CO3 | 1 | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Web Technology |
| **Course Code** | CSP0201[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Prerequisite: Student must have little knowledge about internet and web pages as well as the awareness about the fundamentals of programming | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various Web Development Strategies and syntax rules of web Programming**(BL1-Remember)**<br>**CO2-** : To understand the basics of web architecture, Types of architecture, knowledge about web protocols and web development tools**(BL2-Understand)**<br>**CO3-** To implement: HTML, CSS, Javascript and XML web designing language to create Web pages. **(BL3-Apply)**<br>**CO4-** To analyze various Client-side programming techniques and compare various HTMl versions**(BL4-Analyze)**<br>**CO5-** To evaluate the web pages and layout with the help of Advanced CSS Techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Web architecture, web pages and is types. Client Server architecture. Web Security policy and Web Protocols. Web Designing Vs. Web Developer. Web Developing tools. Search engine: Mechanism and types. Page ranking and Personalization | Whiteboard, PPT, Video | 12 |
| 2 | HTML: Introduction to HTML, elements of html, inline elements, subscript elements, Header elements , Block oriented elements, Visual Markup, Hypertext Links, Uniform Resource Locators, Types of URLs, Images, Creating image links, Lists, types of lists. Linking Documents, HTML Colors, Images, Tables, Frames | EXEPET LECTURE | 12 |
| 3 | HTML5: Forms, Attributes of form, Text area, Special characters, Multimedia. Introduction of HTML5 and its Tags, HTML Canvas, Graphics using HTML5. CSS (Cascading Style Sheets): Introduction Features, adding style to HTML, Core Syntax, Style Sheets vs. HTML, Style Rule Cascading and Inheritance. Client-Side Programming. | ROLE PLAY | 10 |
| 4 | Advanced CSS: CSS Id and Class, Box Model (Introduction, Border properties, Padding properties, margin properties), CSS Advanced (Grouping, Dimension and Display, Positioning, Floating, Align, navigation Bar), CSS Color, Page Design and Layout. | GROUP DISCUSSION | 10 |
| 5 | The JavaScript and XML Language: History and Versions, Introduction to Java Script, Elements of Java Script, Variables and Data Types, Control Statements. Introduction to XML (Extensible Markup Language): XML, Syntax, Documents, Declaration, Tags, Element, Whitespace. | LECTURE | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | PBL | PBL | BL3-Apply | 15 |
| 3-4 | EXPERIMENT | Experiments | BL2-Understand | 15 |
| 5 | CASE STUDY | PBL | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Bayross, I. (2015). Web Enabled Commercial Applications Development using HTML, DHTML, JavaScript, Perl CGI. BPB Publications.Publishing<br>R. Kruse et al. Data Structures and Program Design in C Pearson Education Publication |
| **Articles** | |
| **References Books** | Beighley, L., & Morrison, M. (2019). Head First PHP & MySQL: A Brain-Friendly Guide. O'Reilly. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO2 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 1 |
| CO3 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO4 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO5 | 2 | 1 | - | - | - | - | - | - | 2 | - | - | 2 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Python Programming |
| **Course Code** | CSP0304[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic programming concept**(BL1-Remember)**<br>**CO2-** Understand the basics of Python like python origin downloading and installing and basic concept of python**(BL2-Understand)**<br>**CO3-** Apply the various conditional and looping statement and functional programming.**(BL3-Apply)**<br>**CO4-** Explain various objects numbers and sequence in python Analyze the concept of regular expression.**(BL4-Analyze)**<br>**CO5-** Evaluate the concept of object-oriented programming for better utilization of language.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies)<br>SDG13(Climate action)<br>SDG14(Life below water)<br>SDG15(Life on land) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Introduction to Python programming Introduction, origin of Python, Downloading, Installing and Running Python, Python Basics: Comment, Identifier, Indentations, Basic data types, conversions, operators, Build in functions. I/O Statements, Condition Statements & Loops: If, else, elif), conditional expressions, while, for, break continue | Lectures | 10 |
| Unit 2 | Data Structures in Python Lists: Introduction, Accessing list, Operations, Working with lists, Tuple: Introduction, Accessing tuples, Operations, Working with list, Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Set: Introduction ,Accessing set, Operations, Working with sets | Lectures | 10 |
| Unit 3 | Functions, Modules, File Handling Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous function, Global and local variables, Recursion. Modules: Creating modules, Importing module, Packages, File Handling :Opening and closing files, Reading and writing files | Experiments | 10 |
| Unit 4 | Exceptional Handling, Regular Expressions Exception Handling: Exception, Exception Handling, Try and Except clause, User Defined Exceptions, Exception handling in files). Regular Expressions: Introduction/motivation, special symbols and characters for REs , Match function, Search function., Matching VS Searching., Modifiers, Patterns. | Experiments | 15 |
| Unit -5 | Object Oriented Programming in Python Introduction, OOPS Basics: Class and object, Constructors, Need of Encapsulations, Attributes, default attributes, static attributes, static methods, initializing objects, Pass by reference , self. Relational-ships: Introduction, Aggregation, Dependency. Inheritance: Need of Inheritance, Overriding, Super, Types of Inheritance. Abstract Class, methods. | PBL | 15 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Program to count the number of each vowel in a string | Experiments | BL2-Understand | 1 |
| 2 | Program To Display Powers of 2 Using Anonymous Function. | Experiments | BL2-Understand | 1 |
| 3 | Program to Accept Three Digits and Print all Possible Combinations from the Digits. | Experiments | BL2-Understand | 1 |
| 4 | Program to Find the Sum of the Series: 1 + x^2/2 + x^3/3 + … x^n/n. | Experiments | BL2-Understand | 1 |
| 5 | Program to Create a List of Tuples with the First Element as the Number and Second Element as the Square of the Number. | Experiments | BL2-Understand | 1 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Naughton, P., & Schildt, H. (1997b). Java 2: The Complete reference. http://182.160.97.198:8080/xmlui/handle/123456789/133 |
| **Articles** | |
| **References Books** | Horstmann& Cornell “Core Java 2” (Vol I &II ) Sun Microsystems<br>Deitel Java- How to Program Pearson Education, Asia<br>IvanBayross Java 2.0 BPB publications |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Advance Java |
| **Course Code** | CSP0406[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of any one programming language such as C/C++ | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax rules of java programming**(BL1-Remember)**<br>**CO2-** To understand various Object-Oriented Concepts Exception handling, Multithreading, networking, and database connectivity techniques**(BL2-Understand)**<br>**CO3-** To implement java AWT and applet and for GUI Programming and Event handling, java IO for Input and output handling, jdbc for database connectivity**(BL3-Apply)**<br>**CO4-** To analyze various Error, and Database Handling techniques to learn how to improve the performance of the java application.**(BL4-Analyze)**<br>**CO5-** To evaluate and compare the performance of various application Development techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of java: Introduction to JAVA History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; JVM and JRE;A simple program, its compilation and execution; the concept of path and class path: Java Basics: Data types; Operators- precedence and associatively; Type conversion; decision making controls – if, if ..else, switch; loops – for, while, do...while; advanced for loop. Special statements–return, break, continue Modular programming: methods and method overloading, memory allocation and garbage collection, static and volatile keyword | Lecturing, Experiments | 5 |
| 2 | Object Oriented Programming in Java: Class fundamentals, java Packages, Access specifies, Constructors; Copy constructor; this pointer; finalize() method, array and String, mutable and immutable; String Buffer and String Builder; Java Inheritance: Inheritance basics, method overriding, polymorphism static and dynamic polymorphism Abstract Class & Interfaces: abstract classes, uses of abstract classes implementation of abstract class, defining an interface, implementing & applying interfaces, extending interfaces | Lecturing, Experiments | 10 |
| 3 | Exception Handling; understanding Exception and its classes; class. hierarchy for Throwable, call stack mechanism, checked and unchecked Exception. Try, catch and finally block, throw and throws clause. Multithreading: Basic idea of a Thread, differences between process and Thread, multithreaded programming; different states of a Active thread, The lifecycle of a thread; Creating thread with the thread class and runnable interface, thread constructor and thread methods; Thread synchronization; Thread scheduling; Producer consumer relationship; Daemon thread, Selfish threads, interthread communication. | Lecturing, Experiments | 10 |
| 4 | Java AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, menu and Choice menu, Text area, Frame; Layout managers. Java Applets: Introduction of java Applet, Life cycle of applet; HTML Tags for applet. Java Event Handling Model: Java's event delegation model – ignoring the event, Self-contained events, Delegating events; The event class hierarchy; The relationship between interface, methods called, parameters and event source, Event listeners: Action Listener, Mouse Listener, Key Listener | Lecturing, Experiments | 10 |
| 5 | Collection Framework: Introduction to collections framework, collection interfaces, collection classes. JAVA Database Connectivity (JDBC): JDBC Drivers, Connection Interface, Result set types of Result Set, applying insert, delete, display and update operation JDBC with java AWT. | Lecturing, Experiments | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-5 | PBL | PBL | BL5-Evaluate | 45 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 20 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Naughton, P. & Schildt, H. (2002). The Complete Reference Java 2. Tata McGraw Hill. |
| **Articles** | |
| **References Books** | Horstmann, C. S., & Cornell, G. (2008). Core Java 2 (Vol. I & II). Sun Microsystems.<br>Deitel, P. J. (2017). Java- How to Program. Pearson Education, Asia. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | 2 | 1 |
| CO2 | 1 | 2 | 1 | 1 | 2 | 2 | - | - | - | 3 | - | - | 2 | 3 | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | 1 | - | - | 3 | 2 | 3 |
| CO4 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Digital Electronics |
| **Course Code** | ECL0305[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 1 | 3 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | A basic idea regarding the initial concepts of Digital Electronics is enough to understand the course. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To learn basic techniques and fundamental concepts for the design of digital systems.**(BL1-Remember)**<br>**CO2-** To grasp the knowledge of common forms of number system representation and understand the conversions of numbers in digital electronic. **(BL2-Understand)**<br>**CO3-** Apply logical operations to solve general problems (Addition, subtraction, multiplication) of mathematics. **(BL3-Apply)**<br>**CO4-** To analyzed and evaluated the output of combinational circuits for different operations and with the help of concepts of Boolean algebra and logic family analyze sequential systems in terms of state machines.**(BL4-Analyze)**<br>**CO5-** To design combinational logic circuits, sequential logic circuits for specific purpose. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies)<br>SDG13(Climate action)<br>SDG14(Life below water)<br>SDG15(Life on land) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | BINARY SYSTEMS, BOOLEAN ALGEBRA AND LOGIC GATES: Computer and Digital Systems, Number Systems & its Conversions, Complements, Binary codes, Binary Storage and Registers, Binary Logic, Integrated Circuits. Boolean Algebra–Definitions, Theorems, Properties & Function, Canonical and Standard Forms, Digital Logic Gates, Introduction to Digital Logic Families. | Lecture Method / Video/ Group Discussion | 12 |
| 2 | SIMPLIFICATION OF BOOLEAN FUNCIONS Maps, Five and Six Variable Maps, Product of Sums Simplification, NAND and NOR Implementation, Two Level Implementation, Don't–Care Conditions, Tabulation Method, Determination of Prime-Implicants, Selection of Prime- Implicants. The Map Method, Two and Three Variable Maps, Four Variable | Lecture Method / Video/ Group Discussion | 10 |
| 3 | COMBINATIONAL CIRCUIT Introduction, Design Procedure, Adders, Subtract or, Parity Generators, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive-OR and Equivalence Functions, Magnitude Comparator, Decoder, Multiplexers, PLA. | Lecture Method / Video/ Group Discussion | 10 |
| 4 | SEQUENTIAL LOGIC: Introduction, Flip-Flops, Triggering of Flip-Flops–RS, J-K, T & D, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design with State Equations, Registers, Shift, Registers, Counters. | Lecture Method / Video/ Group Discussion | 10 |
| 5 | Memory Organization: Memory Hierarchy, Secondary Memory, Main Memory Organization: Random access Memory(RAM), Read Only memory (ROM), Buildinglarge memories using small RAM and ROM chips, Performance analysis. Associative Memory: Hardware Organization, Matchlogic, Cache memory, Address mapping, writing intocache, Virtual memory: Paging, address mapping, pagereplacement, Segmented page mapping | Lecture Method / Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study various Logic Gates and verify their truth tables. | Experiments | BL5-Evaluate | 2 |
| 2 | To Verify & realization of logic gates using Universal NAND and NOR Gates. | Experiments | BL5-Evaluate | 2 |
| 3 | To Verify Demorgan's Theorem and observe the output. | Experiments | BL5-Evaluate | 2 |
| 4 | To Study Half Adder, Full Adder and Half Subtractor and verify their truth tables. | Experiments | BL5-Evaluate | 2 |
| 2 | To study BCD to Excess-3 code convertor and verify its truth table. | Experiments | BL5-Evaluate | 2 |
| 2 | To study and verify the truth table of 4-to-1 Line Multiplexer. | Experiments | BL5-Evaluate | 2 |
| 4 | Smart Digital SchoolBell With Timetable Display | PBL | BL6-Create | 30 |
| 4 | Smart Home Automation System | PBL | BL6-Create | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Mano, M.M, Digital design, Digital Design, Prentice Hall |
| **Articles** | Markovic, Dejan, Borivoje Nikolic, and Robert Brodersen. "Analysis and design of low-energy flip-flops." Proceedings of the 2001 international symposium on Low power electronics and design. 2001.<br>Alioto, Massimo, Elio Consoli, and Gaetano Palumbo. Flip-flop design in nanometer CMOS. Berlin/Heidelberg, Germany: Springer, 2016. |
| **References Books** | 1. Leach and Malvino, Digital Principles and Applications, TMH<br>2. W.H. Gothman, Digital Electronics, PHI<br>3. Millman and Taub : Pulse, Digital and Switching Waveforms, MGH |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/108/105/108105132/ |
| **Videos** | https://www.youtube.com/watch?v=oNh6V91zdPY&t=1s |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 1 | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | 1 | 2 | 1 | - | 1 | 2 | - | - | - | 3 | - | - | - | - | 2 |
| CO3 | 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | 3 |
| CO4 | 1 | 3 | 1 | - | - | - | - | - | - | - | - | - | - | - | 3 |
| CO5 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Basics of Electricals and Electronics Engineering |
| **Course Code** | EEL0201[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Interdisciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Analysis of Resistive Circuits and Solution of resistive circuits with independent sources**(BL1-Remember)**<br>**CO2-** Analysis of Single Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits. **(BL2-Understand)**<br>**CO3-** Students will gain knowledge regarding various types' semiconductors**(BL3-Apply)**<br>**CO4-** Student will gain knowledge on electronic systems.**(BL4-Analyze)**<br>**CO5-** Student will gain knowledge digital electronics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Electrical Circuit Analysis: KCL and KVL. Voltage and current sources, Superposition theorem, Generation of Alternating Voltage & Currents, Their Equation, Definition, R.M.S and Average values, Vector representation of alternating quantities, Phasor relations between voltage & current in each of resistance, inductance and capacitance, A.C series circuit power & power factor , Resonance in series circuit. | Talks and presentations | 12 |
| 2 | Transformer: Construction & working principle of transformer, Emf equation, No load & Full load phasor diagram , Equivalent circuit, Losses & Efficiency, Voltage Regulation, Open circuit & Short Circuit Test on the Transformer | Talks and presentations | 14 |
| 3 | Semiconductor Basics: Intrinsic and Extrinsic Semiconductor, Current Mechanisms in semiconductors: Drift and Diffusion Current. PN Junction: Formation of PN Junction, Creation of Depletion Layer, Forward and Reverse Biasing, Diode Current Equation, Volt - Ampere characteristics of PN junction diode and effect of temperature on V-I characteristics, Diode resistances, Diode Capacitances. Diode Equivalent circuits: Piecewise Linear approximation Model, Simplified approximation Model, Ideal equivalent circuit. | Talks and presentations | 13 |
| 4 | Diode as Rectifier Half wave rectifier, Full Wave Rectifier, Calculation of Average, RMS loads voltages and currents, Rectification efficiency, PIV, Ripple facto. Break Down Diodes: Avalanche and Zener Breakdown V-I characteristics of. Zener Diode, Zener Diode Specifications, Zener Diode Equivalent Circuit. Zener diode as Shunt Regulator: Analysis of Zener diodes as shunt regulator under varying Load capacitance and Supply voltage | Talks and presentations,Group discussion | 11 |
| 5 | Bipolar Junction Transistor Formation of NPN and PNP Transistor, Unbiased and biased transistor, Transistor currents Symbol of NPN and PNP Transistors, Common Base, Common Emitter and Common Collector, configuration along with input and Output Characteristics Transistor Amplifying action. Transistor Biasing: Load Line, Operating Point, Need of Biasing, Different Biasing Techniques: Fixed Bias Emitter Stabilized Bias, Voltage Divider Bias, DC Bias with Voltage Feedback | Talks and presentations | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Exp-1 | To Verify Kirchoff , s Current Low And Kirchoff , s Voltage Low | Experiments | BL3-Apply | 2 |
| Exp-2 | To Verification of super position theorem. | Experiments | BL3-Apply | 2 |
| Exp-3 | Measurement Of Active & Reactive power in Single Phase AC circuit | Experiments | BL4-Analyze | 2 |
| Exp-4 | Measurement Of Impedance of R-L, R-C,R-L-C & study of resonance phenomena | Experiments | BL5-Evaluate | 2 |
| Exp-5 | Perform load test On a single phase transformer | Experiments | BL4-Analyze | 2 |
| Exp-6 | study of CRO | Experiments | BL4-Analyze | 2 |
| Exp-7 | study of half wave rectifier | Experiments | BL4-Analyze | 2 |
| Exp-8 | study of full wave rectifier | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | 1. Basic Electrical Engg, Sunil S Gaikwad, Dream Tech/ Willey Publication. 2. Hughes, Electrical and Electronic Technology, Pearson Education IX Edition. 3. Basic Electrical Engineering, R K Chaturvedi & Sehdev, Dhanpat Rai . 4. J.S. Katre, Basic Electronics Engg, Max Pub. Pune. 5. S.Ghosh, Fundamentals of Electrical and Electronics Engineering, PHI, II Edition. 6. Nagrath & Kothari, Basic Electrical Engineering, III Edition TMH |
| **Articles** | |
| **References Books** | 1. E W Golding & F C Widdis; Electrical 2.Measurement & Measuring Instruments; Wheeler Pub. 8. A.K. Sawhney; Electrical & Electronic Measurements & Instrument; Dhanpat Rai & Sons Pub. |
| **MOOC Courses** | 1.Basic Electrical Circuits, Electrical Engineering, Dr. Nagendra Krishnapura, IIT Madras, https://archive.nptel.ac.in/courses/108/105/108105112/ 2.Basic Electric Circuits, Electrical Engineering, Prof. Ankush Sharma, IIT Kanpur https://nptel.ac.in/courses/108108076 3.:Basic Electronics, Electrical Engineering, Prof. Mahesh B. Patil, IIT Bombay https://archive.nptel.ac.in/courses/108/101/108101091/ |
| **Videos** | 1.https://www.youtube.com/watch?v=UchitHGF4n8 2.https://www.youtube.com/watch?v=o-Rya9KZYY4 3.https://www.youtube.com/watch?v=IfR_POJPSo0 |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | 1 | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO2 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO3 | 1 | 1 | - | 1 | 1 | 1 | 1 | - | 1 | - | 1 | - | 2 | 2 | 2 |
| CO4 | 1 | - | 1 | 1 | - | 1 | - | - | - | - | - | 1 | 3 | 3 | 2 |
| CO5 | 1 | - | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO6 | 1 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | 1 | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Principles of Management and managerial economics |
| **Course Code** | HUL0602[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | The Students should have a clear understanding of the concept, nature, and significance of management, including the differences between management and administration, as well as the contributions of Fayol and Taylor. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** The students will be able to comprehend the concepts of Management.**(BL1-Remember)**<br>**CO2-** Students will understand the managerial functions and their importance in attaining organizational goals.**(BL2-Understand)**<br>**CO3-** The students will develop an understanding to make business decisions in different business situations.**(BL3-Apply)**<br>**CO4-** Students will analyze the concept of utility, consumer equilibrium, indifference curves, and demand concepts.**(BL4-Analyze)**<br>**CO5-** The students will evaluate the role and responsibilities of managers.**(BL5-Evaluate)**<br>**CO6-** The students will understand market structures and analyze market demand.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production)<br>SDG13(Climate action)<br>SDG14(Life below water)<br>SDG15(Life on land) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction Concept, Nature and Significance of management, Difference between management and administration, contribution of Fayol and Taylor in Management, Levels of management, Functions of management, Managerial roles and Managerial skills. | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 2 | Planning, organizing and staffing Planning: Nature, importance and process of planning, types of plans Organizing: Nature, Process, Significance, and Principles of organization Staffing: Manpower planning: Concept and Need, Recruitment and selection | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 3 | Directing and controlling Directing: Concept, Nature, Principles and Techniques of directing Leadership: Concept and Leadership Styles Motivation: Concept and theories Controlling: Nature, Importance, Process and Types of control, Limitations of control | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 4 | Introduction to Economics Concept and nature of economics, Theory of demand, Measurement of utility, Consumer's equilibrium, law of demand, Law of diminishing marginal utility, Market and Market Structure | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 5 | Theory of production and demand forecasting Laws of production, Laws of returns to scale, Laws of returns to scale through production function, Business Cycle, Meaning of demand forecasting, Techniques of forecasting demand (Quantitative & Qualitative Methods)-Survey and Statistical methods | Interactive Lectures, Case Studies, Experiential Learning | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Assignment | | BL2-Understand | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Massie, J. L. (1979). Essentials of Management (3rd ed.). New Delhi: Prentice - Hall of India Private Limited.<br>Tripathi, P. C., & Reddy, P. N. (2016). Principles of Management. New Delhi: Tata McGraw-Hill Publishing Company Limited. |
| **Articles** | |
| **References Books** | Prasad, L. M. (2015). Principles and Practice of Management. New Delhi: Sultan Chand & Sons. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 1 |
| CO3 | 1 | 1 | 3 | - | - | - | - | - | - | - | - | - | 1 | 3 | - |
| CO4 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | - | 2 | 1 |
| CO5 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 1 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Calculus for Engineers |
| **Course Code** | MAL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Calculus for Engineers typically include a solid understanding of algebra, trigonometry, and precalculus concepts such as functions, limits, and differentiation. Proficiency in basic mathematical operations and problem-solving skills is essential for success in engineering calculus courses. | | | **Co-Requisite/s** | Calculus for Engineers may include concurrent enrollment or prior completion of introductory physics courses. Additionally, proficiency in relevant software tools like MATLAB or Mathematica might be beneficial. A strong foundation in calculus concepts alongside practical application in engineering contexts is often emphasized. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basics about the Successive Differentiation, Definite Integration and Vector Calculus.**(BL1-Remember)**<br>**CO2-** To understand the concepts of derivatives (Partial and Successive), Integration and its applications apply to evaluate the Maxima and Minima.**(BL2-Understand)**<br>**CO3-** To apply the solution of the studied engineering problem from an application point of view.**(BL3-Apply)**<br>**CO4-** To Analyse the real-world problems in field of Engineering like problems related to Solution of differential equations through successive differentiation, partial differentiation, integration and difference between scalar and vector quantity.**(BL4-Analyze)**<br>**CO5-** To evaluate the derivatives (successive differentiation, and partial differentiation) as well as fundamentals and applications of Integral calculus including scalar and vector calculus.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG4(Quality education)<br>SDG5(Gender equality)<br>SDG8(Decent work and economic growth) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Differentiation, Extrema on an Interval, Rolle's Theorem and the Mean Value Theorem, Increasing and Decreasing functions and First derivative test, Second derivative test, Maxima and Minima. Functions of two variables, partial derivatives, total differential, Jacobian and it Prosperities. | Audio/Video clips, group discussion, lecture with ppt, quiz | 10 |
| 2 | Taylor's expansion for two variables, maxima and minima, constrained maxima and minima, Lagrange's multiplier method. Integration, Average function value, Area between curves, Volumes of solids of revolution, Beta and Gamma functions, interrelation. | Audio/Video clips, group discussion, lecture with ppt, Review Analysis | 9 |
| 3 | Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar coordinates, Evaluation of triple integrals, change of variables between Cartesian and cylindrical and spherical coordinates, evaluation of multiple integrals using gamma and beta functions. | | 9 |
| 4 | Scalar and vector valued functions, gradient, tangent plane, directional derivative, divergence and curl, scalar and vector potentials, Statement of vector identities, Simple problems. | Audio/Video clips, group discussion, lecture with ppt, quiz | 9 |
| 5 | line, surface and volume integrals , Statement of Green's, Stoke's and Gauss divergence Theorems, verification and evaluation of vector integrals using them. | Audio/Video clips, group discussion, lecture with ppt, quiz | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to MATLAB through matrices, and general Syntaxes, | Experiments | BL3-Apply | 2 |
| 2 | Plotting and visualizing curves and surfaces in MATLAB– Symbolic computations using MATLAB | Experiments | BL3-Apply | 2 |
| 3 | Evaluating Extremum of a single variable function | Experiments | BL3-Apply | 2 |
| 4 | Understanding integration as Area under the curve | Experiments | BL3-Apply | 2 |
| 5 | Evaluation of Volume by Integrals (Solids of Revolution ) | Experiments | BL3-Apply | 2 |
| 6 | Evaluating Maxima and minima of functions of several variables | Experiments | BL3-Apply | 4 |
| 7 | Evaluating triple integrals | Experiments | BL3-Apply | 2 |
| 8 | Evaluating gradient, curl and divergence | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | B.V. Ramana Higher Engineering Mathematics, Tata McGraw Hill.<br>B.S. Grewal Higher Engineering Mathematics, Khanna Publishers.<br>George B. Thomas, D. WeirandJ. Hass Thomas' Calculus 13 th edition 2014, Pearson. |
| **Articles** | |
| **References Books** | E.Kreyszig Advanced Engineering Mathematics, 8 th Ed., John Wiley and Sons, 1999.<br>Gorakhprasad Differential Calculus Pothishala Publication.<br>Gorakhprasad Integral Calculus Pothishala Publication |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ma12/preview<br>https://onlinecourses.nptel.ac.in/noc24_ma33/preview<br>https://onlinecourses.nptel.ac.in/noc24_ma02/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ma12/preview<br>https://onlinecourses.nptel.ac.in/noc24_ma33/preview<br>https://onlinecourses.nptel.ac.in/noc24_ma02/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | 1 | - | - | - | - | 1 | - | 1 |
| CO2 | 3 | 3 | 1 | 3 | 3 | 2 | - | 1 | - | 1 | - | - | 2 | - | 2 |
| CO3 | 3 | 2 | - | 1 | 3 | - | - | - | - | - | - | - | 1 | 3 | 2 |
| CO4 | 3 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | 3 | 1 |
| CO5 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 2 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Statistics for Engineers |
| **Course Code** | MAL0201[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | statistics for engineers typically include a foundational understanding of mathematics, including algebra and calculus. Familiarity with probability theory and basic concepts of engineering is also beneficial. Proficiency in using statistical software such as R or Python may be required for practical applications. | | | **Co-Requisite/s** | statistics for engineers may include concurrent enrollment in courses such as calculus, engineering mathematics, and introductory engineering courses. Familiarity with software tools like Excel, MATLAB, or Python for data analysis and visualization may also be necessary to complement statistical concepts with practical application. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember basic concept of about the design data collection plans and basic tools of descriptive statistics.**(BL1-Remember)**<br>**CO2-** To understand the identify relationship between two variables using scatter plot and Interpret a simple correlation. To understand the Knowledge about the different types of continuous distribution with their properties and applications.**(BL2-Understand)**<br>**CO3-** To apply the test and make hypothesis by Student's t-test, F-test, chi-square test, Z test, goodness of fit.**(BL3-Apply)**<br>**CO4-** To analyze the concept of sampling distribution of a statistic and its properties, difference between parameter and statistic.**(BL4-Analyze)**<br>**CO5-** To evaluate and describe the properties of unbiasedness. Also identifying and provide an application the null hypothesis, alternative hypothesis and test statistic.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | tInroduction to statistics and data analysis Measures of central tendency, Measures of variability, [Moments, Skewness, Kurtosis (Concepts only)]. Correlation and Regression, Partial and Multiple correlations, Multiple regressions. | Audio/Video clips, group discussion, lecture with ppt, quiz | 10 |
| 2 | Introduction, random variables, Probability mass Function, distribution and density functions, joint Probability distribution and joint density functions, Marginal, conditional distribution and density functions, Mathematical expectation, and its properties Covariance, moment generating function, characteristic function. | Audio/Video clips, group discussion, lecture with ppt, Review Analysis | 10 |
| 3 | Binomial and Poisson distributions, Normal distribution, Gamma distribution, Exponential distribution. | Audio/Video clips, group discussion, lecture with ppt, classroom presentations, Analysis | 6 |
| 4 | Testing of hypothesis, Introduction, Types of errors, critical region, procedure of testing hypothesis, Large sample tests, Z test for Single Proportion, Difference of Proportion, mean and difference of means. | Audio/Video clips, group discussion, lecture with ppt, quiz | 10 |
| 5 | Small sample tests, Student's t-test, F-test, chi-square test, goodness of fit, independence of attributes, Design of Experiments, Analysis of variance, one and two way classifications, CRD, RBD, LSD. | Audio/Video clips, group discussion, lecture with ppt, quiz | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction: Understanding Data types; importing/exporting data. | Experiments | BL3-Apply | 2 |
| 2 | Computing Summary Statistics/plotting and visualizing data using Tabulation and Graphical Representations. | Experiments | BL3-Apply | 2 |
| 3 | Applying correlation and simple linear regression model to real dataset; Computing and interpreting the coefficient of determination | Experiments | BL3-Apply | 2 |
| 4 | Applying multiple linear regression model to real data set; computing and interpreting the multiple coefficient of determination | Experiments | BL3-Apply | 2 |
| 5 | Fitting the following probability distributions: Binomial distribution, | Experiments | BL3-Apply | 2 |
| 6 | Normal distribution Poisson distribution | Experiments | BL3-Apply | 2 |
| 7 | Testing of hypothesis for One sample mean and proportion from real, time problems | Experiments | BL3-Apply | 2 |
| 8 | Testing of hypothesis for Two sample mean and proportion from real, time problems | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | M. Ray, H.S. Sharma, Sanjay Chaudhary Mathematical Statistics Ram Prasad & Sons<br>J.N. Sharma, J.K. Goyal Mathematical Statistics Krishna Prakash and Media (P) Ltd |
| **Articles** | |
| **References Books** | E.Kreyszig Advanced Engineering Mathematics 8 th Ed., John Wiley and Sons, 1999<br>B.V. Ramana Higher Engineering Mathematics Tata McGraw Hill<br>B. S. Grewal Higher Engineering Mathematics Khanna Publishers |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ec03/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ec03/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | 1 | - | - | - | - | 1 | - | 1 |
| CO2 | 3 | 3 | 1 | 3 | 3 | 2 | - | 1 | - | 1 | - | - | 2 | - | 2 |
| CO3 | 3 | 2 | - | 1 | 3 | - | - | - | - | - | - | - | 1 | 3 | 2 |
| CO4 | 3 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | 3 | 1 |
| CO5 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 2 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Engineering Graphics |
| **Course Code** | MEL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of geometrical construction, sketching, imagination etc. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To get the fundamentals of engineering graphics, geometrical construction and its applications.**(BL1-Remember)**<br>**CO2-** To understand the basic concept of engineering graphics through real-life examples. **(BL2-Understand)**<br>**CO3-** To implement the different engineering graphics concepts over appropriate drawing dataset. **(BL3-Apply)**<br>**CO4-** To analyze the drawing performance of engineering graphics techniques.**(BL4-Analyze)**<br>**CO5-** To evaluate the drawing performance of engineering graphics techniques on a corresponding object.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | 1. Drafting tools, 2. Principles of Graphics, 3. Geometrical constructions 4. Scales: Plain, diagonal, 5. Curves used in engineering practice: such as ellipse, parabola, hyperbola by different methods. Cycloidal curves, Involutes and Spirals. | Lecture with Whiteboard, PPT | 8 |
| Unit-2 | 1. Types of projection, Orthographic projections, First angle and third angle projection. 2. Projections of points in different quadrants. Projections of lines, True inclination and true length of straight line, Traces. | Lecture with Whiteboard, PPT | 8 |
| Unit-3 | Projections of planes: Perpendicular plane, oblique plane and Auxiliary plane, projection of planes with inclined to one or both the reference planes and traces of planes. | Lecture with Whiteboard, PPT | 8 |
| Unit-4 | 1. Projection of solids: Polyhedron and solids of revolution, projection of solids with inclined to one or both the reference planes. 2. Introduction to Section of solids and Development of surfaces. | Lecture with Whiteboard, PPT | 8 |
| Unit-5 | 1. Isometric projection: Isometric scale, isometric projections from orthographic drawing. 2. Computer Aided Drafting (CAD): Introduction, benefit, software's, basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD. | Lecture with Whiteboard, PPT | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Drawing sheet of plane scale. | Experiments | BL3-Apply | 2 |
| Experiment -2 | Drawing sheet of diagonal scale. | PBL | BL3-Apply | 2 |
| Experiment -3 | Drawing sheet of ellipse. | PBL | BL3-Apply | 2 |
| Experiment -4 | Drawing sheet parabola and hyperbola | PBL | BL3-Apply | 2 |
| Experiment -5 | Drawing sheet of cycloidal curves. | PBL | BL3-Apply | 2 |
| Experiment -6 | Drawing sheet of orthographic projection | PBL | BL3-Apply | 2 |
| Experiment -7 | Drawing sheet of projection of line | | BL3-Apply | 2 |
| Experiment -8 | Drawing sheet of projection of plane. | | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. N.D.Bhatt Elementary of Enginnering Drawing Charotar Publication<br>P.S. Gill Engineering Drawing Kataria Publication<br>Agrawal and Agrawal Engineering Drawing TMH |
| **Articles** | |
| **References Books** | Venu Gopal K Engineering Drawing New age<br>K.L. Narayana& P. Kannaiah Engineering Drawing SCITECH Pub. |
| **MOOC Courses** | https://nptel.ac.in/courses/112103019 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 2 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | - | - | 2 | 1 | 1 | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ComputerScience

| | |
|---|---|
| **Title of the Course** | Engineering Mechanics |
| **Course Code** | MEL0201[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 Remember the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions**(BL1-Remember)**<br>**CO2-** CO2 Understand the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions.**(BL2-Understand)**<br>**CO3-** CO3 Apply system of forces in the belts drive systems as power transmission devices, shafts and beams.**(BL3-Apply)**<br>**CO4-** CO4 Analyze the beams and trusses with centre of mass and moment of inertia.**(BL4-Analyze)**<br>**CO5-** CO5 Evaluate shear force and bending moment in designing of shafts and beams and trusses.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction of Engineering Mechanics Basic concepts of system of forces- Coplanar Concurrent Forces - Components in Space – Resultant Moment of Forces and its Application - Couples and Resultant of Force System - Equilibrium of System of Forces- Free body diagrams- Equations of Equilibrium of Coplanar Systems and Spatial Systems. | Lectures with whiteboard/PPT, Quiz, Group discussion | 9 |
| Unit-2 | Friction Types of friction, Limiting friction, Laws of Friction, static and Dynamic Friction. Motion of Bodies - Wedge, Ladder and Screw jack. | Lectures with whiteboard/PPT, Quiz, Group discussion | 7 |
| Unit-3 | Transmission of Power Belt Drivers - Open, Crossed and compound belt drives, length of belt, tensions- tight side and slack side, Power transmitted and condition for maximum power. | Lectures with whiteboard/PPT, Quiz, Group discussion | 7 |
| Unit-4 | Center of Gravity & Moment of Inertia: Centroids - Centroids of Composite figures - Centre of Gravity of Bodies - Area moment of Inertia: - polar Moment of Inertia - Transfer - Theorems - Moments of Inertia of Composite Figures, Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia.. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Shear Force & Bending Moment Diagrams & Trusses: Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple. Application of Equilibrium Concepts. Trusses- types, method of joints and method of moments. | Lectures with whiteboard/PPT, Quiz, Group discussion | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | 1. To verify the law of Triangle of forces and Lami's theorem. | Experiments | BL3-Apply | 2 |
| Experiment-2 | 2. To verify the law of parallelogram of forces | Experiments | BL3-Apply | 2 |
| Experiment-3 | 3. To verify law of polygon of forces | Experiments | BL3-Apply | 2 |
| Experiment-4 | 4. To find the support reactions of a given truss and verify analytically. | Experiments | BL3-Apply | 2 |
| Experiment-5 | 5. To determine support reaction and shear force at a given section of a simply supported beam and verify in analytically using parallel beam apparatus. | Experiments | BL3-Apply | 2 |
| Experiment-6 | 6. To verify bending moment at a given section of a simply supported beam. | Experiments | BL3-Apply | 2 |
| Experiment-7 | 7. To find coefficient of friction on horizontal and inclined planes. | Experiments | BL3-Apply | 2 |
| Experiment-8 | 8. To determine centre of gravity of different shapes. | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Engineering Mechanics by Dr. D.S. Kumar, S.K. Kataria & sons, latest edition. Engineering Mechanics by R. K. Rajput, S.Chand & Co. Engineering Mechanics: Statics & Dynamics by R.C. Hibbler |
| **Articles** | |
| **References Books** | • Engineering Mechanics- statics dynamics by Boresi & Schmidt, Thomson Books • Engineering Mechanics - Schaum's series - Mc.Grawhill Publications. • Engineering Mechanics by S. Timashenko, D.H. Young and J.V. Rao |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106286/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | - | 1 | 3 | - | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | - | 1 | 2 | 1 | 1 | 1 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Evaluation of Industrial Training -1 |
| **Course Code** | CED0301[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | subject knowledge of first and second semester . | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions**(BL2-Understand)**<br>**CO2-** To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university**(BL2-Understand)**<br>**CO3-** To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society**(BL3-Apply)**<br>**CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)**<br>**CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✓<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Students have to submit a report on training and give a presentation on his/her experience | Presentation | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices. | Field work | BL3-Apply | 40 hrs |
| Module-II | It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings. | Field work | BL4-Analyze | 40 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 0 | 1 | 0 | 2 | 1 | 3 | 2 | 3 | 2 | 0 | 2 | 1 | 1 | 2 |
| CO2 | 2 | 1 | 0 | 0 | 2 | 1 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 1 |
| CO3 | 2 | 1 | 0 | 0 | 2 | 1 | 3 | 3 | 2 | 2 | 0 | 2 | 2 | 2 | 1 |
| CO4 | 2 | 0 | 1 | 0 | 2 | 0 | 3 | 2 | 2 | 2 | 0 | 2 | 1 | 2 | 1 |
| CO5 | 2 | 1 | 0 | 0 | 2 | 1 | 3 | 3 | 3 | 2 | 0 | 2 | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Industrial Training |
| **Course Code** | CED0501[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Basic Knowledge of Civil Engineering | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions**(BL2-Understand)**<br>**CO2-** To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university**(BL2-Understand)**<br>**CO3-** To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society**(BL3-Apply)**<br>**CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)**<br>**CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)** | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✓<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Students have to submit a report on training and give a presentation on his/her experience | Presentation | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices. | Field work | BL3-Apply | 40 hrs |
| Module-II | It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings. | Field work | BL4-Analyze | 40 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 0 | 1 | 0 | 2 | 1 | 3 | 2 | 3 | 2 | 0 | 2 | 1 | 1 | 2 |
| CO2 | 2 | 1 | 0 | 0 | 2 | 1 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 1 |
| CO3 | 2 | 1 | 0 | 0 | 2 | 1 | 3 | 3 | 2 | 2 | 0 | 2 | 2 | 2 | 1 |
| CO4 | 2 | 0 | 1 | 0 | 2 | 0 | 3 | 2 | 2 | 2 | 0 | 2 | 1 | 2 | 1 |
| CO5 | 2 | 1 | 0 | 0 | 2 | 1 | 3 | 3 | 3 | 2 | 0 | 2 | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Minor Project |
| **Course Code** | CED0601[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Civil engineering and interdisciplinary subjects. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To enhance writing skills and knowledge. **(BL2-Understand)**<br>**CO2-** To increase their mental ability.**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)**<br>**CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Project/Problem Identification | Project Work | 8 |
| 2 | Project Analysis, Requirement Gathering | Project Work | 8 |
| 3 | Implementation of Project/Solution | Project Work | 8 |
| 4 | Testing and Verification | Project Work | 8 |
| 5 | Presentation and Report Writing | Project Work | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Identification of a problem and formulation of a topic of project/thesis | PBL | BL3-Apply | 15 hrs |
| Module-III | Dissertation and Viva-voci | PBL | BL5-Evaluate | 20 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - |
| CO2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | - |
| CO3 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | - |
| CO4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | - |
| CO5 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Industrial training |
| **Course Code** | CED0702[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Basic Knowledge of Civil Engineering | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the 'real' working environment and get acquainted with the organization structure, business operations and administrative functions**(BL2-Understand)**<br>**CO2-** To have hands-on experience in the students' related field so that they can relate and reinforce what has been taught at the university**(BL2-Understand)**<br>**CO3-** To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society**(BL3-Apply)**<br>**CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)**<br>**CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)** | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✓<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Students have to submit a report on training and give a presentation on his/her experience | Presentation | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices. | Field work | BL3-Apply | 40 hrs |
| Module-II | It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings. | Field work | BL4-Analyze | 40 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 0 | 1 | 0 | 2 | 1 | 3 | 2 | 3 | 2 | 0 | 2 | 1 | 1 | 2 |
| CO2 | 2 | 1 | 0 | 0 | 2 | 1 | 2 | 3 | 3 | 2 | 1 | 2 | 2 | 1 | 1 |
| CO3 | 2 | 1 | 0 | 0 | 2 | 1 | 3 | 3 | 2 | 2 | 0 | 2 | 2 | 2 | 1 |
| CO4 | 2 | 0 | 1 | 0 | 2 | 0 | 3 | 2 | 2 | 2 | 0 | 2 | 1 | 2 | 1 |
| CO5 | 2 | 1 | 0 | 0 | 3 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Major Project (Planning and Literature Survey) |
| **Course Code** | CED0703[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Civil engineering and interdisciplinary subjects. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To enhance writing skills and knowledge.**(BL2-Understand)**<br>**CO2-** To increase their mental ability.**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)**<br>**CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Project/Problem Identification | Project Work | 8 |
| 2 | Project Analysis, Requirement Gathering | Project Work | 8 |
| 3 | Writing of Literature Review | Project Work | 8 |
| 4 | Findings of Research Gap | Project Work | 8 |
| 5 | Presentation and Report Writing | Project Work | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Identification of a problem and formulation of a topic of project/thesis | PBL | BL3-Apply | 15 hrs |
| Module-III | Dissertation and Viva-voci | PBL | BL5-Evaluate | 20 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 0 | 0 | 0 | 2 | 1 | 3 | 3 | 3 | 2 | 0 | 2 | 1 | 1 | 2 |
| CO2 | 2 | 0 | 1 | 0 | 1 | 0 | 2 | 2 | 3 | 2 | 0 | 2 | 2 | 2 | 1 |
| CO3 | 1 | 1 | 0 | 0 | 2 | 1 | 3 | 3 | 3 | 2 | 0 | 1 | 1 | 1 | 1 |
| CO4 | 2 | 1 | 1 | 0 | 1 | 1 | 3 | 2 | 2 | 2 | 0 | 2 | 1 | 1 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Major Project |
| **Course Code** | CED0804[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 8 | 8 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Civil engineering and interdisciplinary subjects. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To enhance writing skills and knowledge.**(BL2-Understand)**<br>**CO2-** To increase their mental ability.**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)**<br>**CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Project/Problem Identification | Project Work | 8 |
| 2 | Project Analysis, Requirement Gathering | Project Work | 8 |
| 3 | Implementation of Project/Solution | Project Work | 8 |
| 4 | Testing and Verification | Project Work | 8 |
| 5 | Presentation and Report Writing | Project Work | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Identification of a problem and formulation of a topic of project/thesis | PBL | BL3-Apply | 15 hrs |
| Module-III | Dissertation and Viva-voci | PBL | BL5-Evaluate | 20 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 0 | 0 | 0 | 2 | 1 | 3 | 3 | 3 | 2 | 0 | 2 | 1 | 1 | 2 |
| CO2 | 2 | 0 | 1 | 0 | 1 | 0 | 2 | 2 | 3 | 2 | 0 | 2 | 2 | 2 | 1 |
| CO3 | 1 | 1 | 0 | 0 | 1 | 2 | 3 | 3 | 3 | 2 | 0 | 1 | 1 | 1 | 1 |
| CO4 | 2 | 1 | 1 | 0 | 1 | 1 | 3 | 2 | 2 | 2 | 0 | 2 | 1 | 1 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Water Resource & Irrigation Engineering |
| **Course Code** | CEE0601[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 2 | 0 | 5 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | known about the soil properties | | | **Co-Requisite/s** | known about basic structure | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts in theory of irrigation engg.**(BL1-Remember)**<br>**CO2-** To understand & analyze the different irrigation engg problems.**(BL2-Understand)**<br>**CO3-** To implement the different designing concepts of canal and well structures.**(BL3-Apply)**<br>**CO4-** To provide experimental basis, and to enable the students to analyze the flood prediction.**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of different irrigation engg in various fields such as research & industries.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit 1 | Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, raingauge over a drainage area, mass rainfall curves, intensity Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph S curve hydrograph, synthetic unit hydrograph. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unitII | Floods and Ground water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge necessity and methods of improving ground water storage. Water logging prevention. Salt efflorescence-causes and effects. Reclamation of water logged and salt affected lands. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| unit III | Irrigation water requirement and soil necessity, advantages and disadvantages, types and methods. Irrigation development. types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity,optimum water supply, consumptive use and its determination. Irrigati methodssurface and subsurface, sprinkler and drip irrigation.Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop roation , intensity of irrigation | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| unit IV | Canal irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings economics.Canal falls & cross drainage works, regulators. escapes and outlets, canal transitions | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit V | Well irrigation: Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation. Rain water harvesting | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | module of canal designing by khosla theory | PBL | BL4-Analyze | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Irrigation and water power engg B.c. punamia |
| **Articles** | https://muthuramanp.wordpress.com/wp-content/uploads/2020/01/ce8603-notes.pdf |
| **References Books** | Water resource and Irrigation engg by s.k. garg |
| **MOOC Courses** | https://www.mooc-list.com/tags/irrigation |
| **Videos** | https://www.youtube.com/watch?v=01ixEzcKABc |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 3 | 1 | - | 2 | - | 3 | 2 | 1 | 1 | - | - | - |
| CO2 | 1 | 1 | 2 | 2 | - | - | 1 | - | 1 | 3 | - | 1 | - | - | - |
| CO3 | 2 | 1 | 3 | 1 | - | - | 1 | - | - | - | - | 2 | - | - | - |
| CO4 | 1 | - | 1 | - | 1 | - | - | - | 1 | - | - | 2 | - | - | - |
| CO5 | - | - | - | 1 | - | - | 2 | - | 1 | - | - | - | - | 1 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Geo-synthetics and Reinforced Soil Structures |
| **Course Code** | CEE0602[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Identify the type of Geosynthetic and their relevance**(BL2-Understand)**<br>**CO2-** Analyze &compute different properties of Geosynthetics**(BL4-Analyze)**<br>**CO3-** Understand the emerging trends of Geosynthetic in geotechnical applications**(BL2-Understand)**<br>**CO4-** Design the Reinforced Earth Walls using Geosynthetic material**(BL5-Evaluate)**<br>**CO5-** Design the Reinforced Foundation using Geosynthetic materials**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Students will use different materials for soil stabilization | PBL | BL4-Analyze | 15 |
| 2 | Incresing the compressive strength of soil with different fibres | PBL | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Koerner, R.M. "Designing with Geosynthetics", Prentice Hall, New Jersey, USA, 4thedition, 1999 Jewell, R.A., "Soil Reinforcement with Geotextiles", Special Publication No. 123,CIRIA, Thomas Telford. London, UK, 1996 |
| **Articles** | https://www.researchgate.net/publication/330788128_A_Study_on_Geosynthetics_Material_in_soil_Reinforcement |
| **References Books** | Geosynthetics - New Horizons, Eds. G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana,Asian Books Private Ltd., New Delhi, 2004 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/106/105106052/ |
| **Videos** | https://www.youtube.com/watch?v=7Im_fxGLUmk&t=1s |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 2 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 1 | 3 | 3 | 3 |
| CO4 | 3 | 2 | 1 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | 2 | 2 |
| CO5 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | 2 | 2 | 2 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Introduction to Finite Element Analysis |
| **Course Code** | CEE0603[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the fundamental concepts of finite element method to solve engineering problems**(BL2-Understand)**<br>**CO2-** Formulate finite element models using appropriate element selection, development ofstiffness & force matrices, and application of boundary conditions**(BL3-Apply)**<br>**CO3-** Solve structural, thermal, and dynamic problems using the developed finite element formulations**(BL4-Analyze)**<br>**CO4-** Demonstrate the ability to create models for structural, thermal, and fluid flow applications using commercial finite element packages**(BL3-Apply)**<br>**CO5-** Interpret the analysis results to improve product and system design**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Comparative study of different properties of materials | PBL | BL3-Apply | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Rao, S.S., "The Finite Element Method in Engineering", 6/e, Butterworth-Heinemann Publisher, 2018 |
| **Articles** | Reddy J.N, "An Introduction to Finite Element Method", McGraw-Hill International Education, 3/e., 2005 |
| **References Books** | Chandrupatla, T.R., and Belegundu, A.D., "Introduction to Finite Element in Engineering", 4/e, Prentice Hall of India Pvt. Ltd.', New Delhi, 2012 |
| **MOOC Courses** | https://www.amrita.edu/course/introduction-to-finite-element-method/ |
| **Videos** | https://www.youtube.com/watch?v=2iUnfPRk6Ro |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 | 1 | 2 |
| CO2 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | - | 1 | 3 | 1 | 1 |
| CO3 | 3 | 1 | 3 | 1 | 2 | - | - | - | 2 | - | - | 1 | 3 | 2 | 1 |
| CO4 | 3 | 2 | 2 | 2 | 2 | - | - | - | 2 | - | - | 2 | 3 | 1 | 1 |
| CO5 | 3 | 3 | 3 | 3 | 3 | - | - | - | 3 | - | - | 3 | 3 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Smart Cities |
| **Course Code** | CEE0604[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will Acquaint knowledge on smart cities planning and development**(BL2-Understand)**<br>**CO2-** Develop work break down structure, scheduling and project management of smart cities**(BL3-Apply)**<br>**CO3-** Work out the most energy efficient technique for development of Smart Cities**(BL4-Analyze)**<br>**CO4-** To understand the importance of different smart system**(BL2-Understand)**<br>**CO5-** To understand latest technologies used in intelligent building**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Smart cities: Introduction to city planning Concept, Principle stakeholders, key trends in smart cities developments | Lectures with Presentation, Seminars | 10 |
| 2 | Smart Cities Planning and Development: Understanding smart cities, Dimension of smart cities, Global Standards and performance benchmarks, Practice codes, Smart city planning and development | Lectures with Presentation, Seminars | 10 |
| 3 | Financing smart cities development, Governance of smart cities | Lectures with Presentation, Seminars | 6 |
| 4 | Project management in Smart Cities: Phases, Stages of project and work break down Structure, Project organization structure, Planning, Scheduling and CPM, Project cost analysis, resource allocation & leveling, Line of balancing technique, Project monitoring and control, Project risk management | Lectures with Presentation, Seminars | 8 |
| 5 | Green building in smart cities: Introduction to green buildings, Rating system, Energy saving system | Lectures with Presentation, Seminars | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Smart material associated with smart building | PBL | BL4-Analyze | 8 |
| 2 | Technology involved in different construction of smart building | PBL | BL3-Apply | 8 |
| 3 | Model preparation on smart city | PBL | BL4-Analyze | 8 |
| 4 | Case study on ITS. | Case Study | BL3-Apply | 10 |
| 5 | Case study on smart city | Case Study | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Jo Beall (1997); "A city for all: valuing differences and working with diversity"; Zed books limited, London (ISBN: 1-85649-477-2) |
| **Articles** | (http://indiansmartcities.in/downloads/CONCEPT_NOTE_-3.12.2014__REVISED_AND_LATEST_.pdf) |
| **References Books** | William J. V. Neill (2004); "Urban Planning and cultural identity"; Routledge, London (ISBN: 0- 415-19747-3) |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/105/105105160/ |
| **Videos** | https://www.youtube.com/watch?v=qX516jcwCKE |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 2 | 1 | 1 | 1 | - | - | - | 1 | 1 | 2 | 1 | 2 |
| CO2 | 3 | 2 | 1 | 2 | 1 | 2 | 1 | - | - | - | 1 | 2 | 2 | 2 | 3 |
| CO3 | 3 | 2 | 2 | 1 | 1 | 2 | 1 | - | - | - | 2 | 1 | 3 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | - | - | - | 1 | 1 | 3 | 1 | 1 |
| CO5 | 2 | 2 | 1 | 1 | 3 | 1 | 1 | - | - | - | 1 | 1 | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | MATRIX ANALYSIS OF STRUCTURES |
| **Course Code** | CEE0701[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will understand the concept of Axial Force Elements**(BL2-Understand)**<br>**CO2-** Students will learn about the Stress and Strain work energy **(BL1-Remember)**<br>**CO3-** Students will be able to analyse Shape Functions for different elements**(BL4-Analyze)**<br>**CO4-** Students will be able to apply the matrix analysis on 2D and 3D frames and Trusses**(BL3-Apply)**<br>**CO5-** Students will be able to understand Buckling Analysis for linear and non linear elements**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction - Review of Structures, Degrees of Freedom & Coordinate Systems, Axial Force Elements, Matrix Condensation, Matrix Condensation Example, Axial Force Elements - Global Equations, Direct Stiffness Method Mathcad Background, member truss | Lectures with problem based learning, experimental learning, case study, | 8 |
| 2 | Stress & Strain - Work & Energy, Axial Force & Torsional Elements, Beam Elements, Frame-Truss Example 3D Coordinate Transformations, Coord. Transformation, Space Truss, Member End Releases - Hinge Example, Virtual Displacements | Lectures with problem based learning, experimental learning, case study, | 8 |
| 3 | Displaced State of Elements - Shape Functions, Element Stiffness from Virtual Displacements, Stiffness Matrices from Virtual Work, Non-nodal Forces from Virtual Displacements, Thermal & Prestrain Loads by Virtual Work, Non uniform Elements, Tapered Element Example, Tapered Element/Log Shape Function | Lectures with problem based learning, experimental learning, case study, | 8 |
| 4 | Non uniform Torsion, Non uniform Torsion 2D vs, 3D comparison, Uniform Torsion, 8-Element Non uniform Torsion, Shear Deformations, Shear Deformation Example, Nonlinear Analysis Nonlinear Examples, Presentation Topic Proposal, Plastic Hinge Example, Matrix Non-linear Analysis, Geometric Stiffness Matrices for 2D, Geometric Stiffness Matrix Example, Geometric Stiffness Matrix Example, Presentation Outline, Nonlinear Material Behavior | Lectures with problem based learning, experimental learning, case study, | 10 |
| 5 | Nonlinear Material Example, Eigenvalue Buckling Analysis, Eigenvalue Buckling Example, Partially Restrained Joints, Presentation Progress Report, Member End Offsets, Restraint/Offset Example, Structural Optimization | Lectures with problem based learning, experimental learning, case study, | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | | PBL | | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Matrix Structural Analysis 2nd ed, by McGuire, Gallagher, and Ziemian |
| **Articles** | https://repository.bakrie.ac.id/10/1/%5BTSI-LIB-131%5D%5BAslam_Kassimali%5D_Matrix_Analysis_of_Structure.pdf |
| **References Books** | MATRIX ANALYSIS OF STRUCTURES by Aslam Kassimali |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/105/105105180/ |
| **Videos** | https://www.youtube.com/watch?v=Wa9ZSWIrpnk |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | 1 | - | - | - | - | - | 2 | 2 | 1 | 2 | 3 | 3 |
| CO2 | 2 | 2 | 1 | 2 | - | - | - | - | - | 2 | 1 | 2 | 3 | 3 | 2 |
| CO3 | 1 | 3 | 1 | 2 | - | - | - | - | - | 2 | 2 | 2 | 3 | 2 | 1 |
| CO4 | 2 | 2 | 2 | 1 | - | - | - | - | - | 2 | 1 | 1 | 2 | 2 | 2 |
| CO5 | 3 | 2 | 2 | 2 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Advanced Foundation Engineering |
| **Course Code** | CEE0702[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | basic foundantion knowledge | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will revise the concept of Exploration of soil.**(BL1-Remember)**<br>**CO2-** Students are able to understand the concept of excavation and different types of foundations.**(BL2-Understand)**<br>**CO3-** Students are able to apply the knowledge of different foundations for construction practices.**(BL3-Apply)**<br>**CO4-** To analyze different theories of bearing capacities and settlements regarding structures.**(BL4-Analyze)**<br>**CO5-** Students will be able to conduct several tests and evaluate different parameters of foundation**(BL5-Evaluate)**<br>**CO6-** To complete foundation work at a construction site.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Different types of piles on the labs of basis of casting, function , distribution of load various factors affecting load carrying capacity of piles, pile load test, static & kinematic analysis of pile groups in sand & clays, Cast in situ pile construction | lecture with experimental learning, interactive workshops, field trips | 10 |
| 2 | Settlement & safe load Carrying capacity of pile foundations, laterally loaded and battered piles, group action of piles, Foundation on expansive soils, drilled piers and caissons, Elements of well foundations, shapes, depth of scour, well sinking, tilts, shift and their prevention | lecture with experimental learning, interactive workshops, field trips | 08 |
| 3 | Basic design criteria for foundation, design of shallow foundation, allowable, total & differential settlement, Bearing capacity effect of water table as per IS code. | lecture with experimental learning, interactive workshops, field trips | 10 |
| 4 | Types of coffer dams, design of cellular coffer dams. | lecture with experimental learning, interactive workshops, field trips | 08 |
| 5 | Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine. | lecture with experimental learning, interactive workshops, field trips | 09 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | spt test | Field work | BL4-Analyze | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Advanced Foundation Engineering By VNS Murthy |
| **Articles** | https://easyengineering.net/advanced-foundation-engineering-book/ |
| **References Books** | Advanced Foundation Engineering By B. C Punamia |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/105/105105207/ |
| **Videos** | https://archive.nptel.ac.in/courses/105/105/105105207/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | - | 2 | 3 | 1 | - | 2 | 1 | 1 | 2 | 3 | 2 | 3 | 1 |
| CO2 | 1 | 2 | 2 | - | 2 | 3 | 1 | - | 3 | 2 | 2 | 1 | 2 | 1 | 2 |
| CO3 | 2 | 1 | 2 | 3 | 2 | 1 | 3 | 1 | - | 2 | 2 | 1 | 2 | 2 | 1 |
| CO4 | 2 | 3 | 3 | 2 | 1 | 2 | 1 | - | 2 | - | 2 | 1 | 3 | 3 | 1 |
| CO5 | 3 | 3 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Pavement Design |
| **Course Code** | CEE0703[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Systematically generate and compile required data's for design of pavement (Highway & Airfield)**(BL3-Apply)**<br>**CO2-** Analyze stress, strain and deflection by boussinesq's, bur mister's and westergaard's theory**(BL4-Analyze)**<br>**CO3-** Design rigid pavement and flexible pavement conforming to IRC58-2002 and IRC37-2001.**(BL4-Analyze)**<br>**CO4-** Evaluate the performance of the pavement and also develops maintenance statement based on site specific requirements**(BL5-Evaluate)**<br>**CO5-** Understand the various causes leading to failure of pavement and remedies for the same**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Desirable characteristics of pavement, Types and components, Difference between Highway pavement and Air field pavement, Design strategies of variables, Functions of subgrade, sub base, Base course, surface course, comparison between Rigid and flexible pavement Fundamentals of Design of Pavements: Stresses and deflections, Principle, Assumptions and Limitations of Boussinesq's theory, Burmister theory and problems | Lectures with Presentation, Site Visit to Highway Construction site | 8 |
| 2 | Design Factors: Design wheel load, contact pressure, Design life, Traffic factors, climatic factors, Road geometry, Subgrade strength and drainage, ESWL concept Determination of ESWL by equivalent deflection criteria, Stress criteria, EWL concept, and problems on above. Flexible pavement Design: Assumptions, Mcleod Method, Kansas method, CBR method, IRC Method (old), CSA method using IRC-37-2001 | Lectures with Presentation, Site Visit to Highway Construction site | 8 |
| 3 | Flexible Pavement Failures, Maintenance and Evaluation: Types of failures, Causes, Remedial/Maintenance measures in flexible pavements, Functional Evaluation by Visual inspection and unevenness measurements, Structural evaluation by Benkleman beam deflection method, Falling weight deflecto meter, GPR method. Design factors for runway pavements, Design methods for Airfield pavement | Lectures with Presentation, Site Visit to Highway Construction site | 8 |
| 4 | Stresses in Rigid Pavement : Types of stress, Analysis of Stresses, Westergaard's Analysis, Modified Westergaard equations, Critical stresses, Wheel load stresses, Warping stress, Frictional stress, combined stresses (using chart / equations), problems on above. Design of Rigid Pavement: Design of CC pavement by IRC: 58-2002 for dual and Tandem axle load, Reinforcement in slabs, Design of Dowel bars, Design of Tie bars, Design factors for Runway pavements, Design methods for airfield pavements | Lectures with Presentation, Site Visit to Highway Construction site | 8 |
| 5 | Rigid Pavement Failures, Maintenance and Evaluation: Types of failures, causes, remedial/maintenance measures in rigid pavements, Functional evaluation by Visual inspection and unevenness measurements, wheel load and its repetition, properties of sub grade, properties of concrete. External conditions, joints, Reinforcement, Requirements of joints, Types of joints, Expansion joint, contraction joint, warping joint, construction joint, longitudinal joint, Design of joints | Lectures with Presentation, Site Visit to Highway Construction site | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Students will Collect the data from highway and develop best design | PBL | BL4-Analyze | 15 hrs |
| 2 | Students will study different types of Pavements that are used in India | Case Study | BL3-Apply | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | S K Khanna, C E G Justo, and A Veeraragavan, "Highway Engineering", Nem Chand & Brothers |
| **Articles** | https://www.researchgate.net/search.Search.html?query=Pavement-Design&type=publication |
| **References Books** | L.R.Kadiyali and Dr.N.B.Lal, " Principles and Practices of Highway Engineering", Khanna publisher |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/106/105106221/ |
| **Videos** | https://www.youtube.com/watch?v=fGcgX63pBk4 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 1 | - | - | - | - | - | - | 2 | 2 | 2 | 2 | 3 |
| CO2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 1 | 3 | 3 | 3 |
| CO3 | 3 | 2 | 3 | 1 | - | - | - | - | - | - | 2 | 2 | 3 | 2 | 2 |
| CO4 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | 2 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Seismic analysis of structures |
| **Course Code** | CEE0704[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | basic knowledge of Rcc and steel structure and its design provisions | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts in theory of seismic structures.**(BL1-Remember)**<br>**CO2-** : To understand & analyze the concept of soft storeys**(BL2-Understand)**<br>**CO3-** To implement the different designing earthquake resistant structures**(BL3-Apply)**<br>**CO4-** : To provide experimental basis, and to enable the students to analyze and test equivalent lateral force method**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of dynamic analysis**(BL5-Evaluate)**<br>**CO6-** : To apply the understanding of retrofitting techniques**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Earthquake Resistant Design, 24 IIT Kanpur Tips. . | lecture with experimental learning, interactive workshops, field trips | 10 |
| 2 | Equivalent lateral force method. (Code based procedure for determination of design lateral force) | lecture with experimental learning, interactive workshops, field trips | 10 |
| 3 | Effects of torsion on the buildings. | lecture with experimental learning, interactive workshops, field trips | 08 |
| 4 | Dynamic analysis. (Code based procedure for determination of design lateral force) Determination of eigen-values and eigen –vectors, model participation factor, model mass, design lateral force, storey shear | lecture with experimental learning, interactive workshops, field trips | 09 |
| 5 | An introduction to seismic analysis of special structures, water tower dam, chimney, bridge, nuclear power plant etc. | lecture with experimental learning, interactive workshops, field trips | 08 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | tune mass demper | PBL | BL4-Analyze | 3 |
| 2 | comparitve studey of base isolated bulding | PBL | BL5-Evaluate | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Earthquake resistant design of structures by Pankaj Agarwal & Manish Shrikhande, PHI Publication House |
| **Articles** | https://www.scribd.com/document/343407200/Pankaj-Agarwal-and-Manish-Shrikhande |
| **References Books** | Earthquake resistant design of structures By Michael R. Lindeburg, Professional Publications House |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/102/105102016/ http://www.digimat.in/nptel/courses/video/105102016/L27.html |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | 3 | 2 | 1 | 3 | - | - | - | 2 | 3 | 2 | 1 | 2 | 1 |
| CO2 | - | 2 | 3 | 1 | 2 | 2 | - | - | 2 | - | 3 | 2 | 1 | 1 | 2 |
| CO3 | 2 | - | 1 | - | 2 | 1 | 3 | 2 | - | 1 | - | - | 2 | 1 | - |
| CO4 | 2 | 2 | - | 3 | 1 | 1 | 2 | 2 | 1 | 3 | 2 | 1 | 3 | 3 | 1 |
| CO5 | 2 | - | 1 | 2 | 2 | 1 | - | 1 | 2 | 3 | 2 | 3 | 2 | 1 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Fundamentals of Remote Sensing & GIS |
| **Course Code** | CEE0705[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Observe, Identify and define simple/ complex problems of day to day lives present in Industry/ Society where GIS and Remote Sensing applications can be useful**(BL2-Understand)**<br>**CO2-** Apply knowledge of basic image interpretation and data image processing.**(BL3-Apply)**<br>**CO3-** Integrate the existing data through various observations from various angles and layer creation**(BL4-Analyze)**<br>**CO4-** Apply problem-solving methodologies to generate, evaluate and justify innovative solutions by designing and conducting/ analyzing and interpreting the data**(BL3-Apply)**<br>**CO5-** Demonstrate the ability to give solutions with an ability which can help communicate effectively for giving betterinterpretation and solutions**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Projects on Water Resource Mapping and Management | PBL | BL4-Analyze | 15 |
| 2 | Projects on Land Use Mapping and LandResource Management | PBL | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Lilliesand T.M. and Kiefer R.W., Remote Sensing and image Interpretation, John Wiley and Sons, New York, 2004 |
| **Articles** | https://www.researchgate.net/publication/225223282_Basics_of_Remote_Sensing |
| **References Books** | Burrrough P.A and McDonnel R.A., Principles of Geographic Information Systems, Oxford university press, 1998 |
| **MOOC Courses** | https://www.iirs.gov.in/pgdiploma |
| **Videos** | https://www.youtube.com/watch?v=VfDAd-MO94o |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 3 | 2 | 2 |
| CO2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 2 | 3 | 2 |
| CO3 | 2 | 1 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | 3 | 2 |
| CO4 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 | 2 | 3 |
| CO5 | 2 | 3 | 2 | - | - | - | - | - | - | - | 2 | 2 | 3 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Fluid Dynamics |
| **Course Code** | CEE0706[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will revise the concepts of fluid properties**(BL1-Remember)**<br>**CO2-** Students will understand the concept of fluid kinematics**(BL2-Understand)**<br>**CO3-** Students will analyse the type of boundary layer flows**(BL4-Analyze)**<br>**CO4-** Students will be able to apply the fluid concepts for hydraulic structures**(BL3-Apply)**<br>**CO5-** Students will be able to evaluate different flow conditions with different defined equations**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Basic Concepts and Fundamentals: Definition and properties of Fluids, Fluid as continuum, Langragian and Eulerian description,Velocity and stress field, Fluid statics, Fluid Kinematics Governing Equations of Fluid Motion: Reynolds transport theorem, Integral and differential forms of governing equations: mass, momentum and energy conservation equations, NavierStokes equations,Euler's equation,Bernoulli's Equation | Lectures with Presentation, Seminars | 8 |
| 2 | Exact solutions of Navier-Stokes Equations: Couette flows,Poiseuille flows, Fully developed flows in noncircular cross-sections, Unsteady flows, Creeping flows Potential Flows: Revisit of fluid kinematics,Stream and Velocity potential function, Circulation, Irrotational vortex,Basic plane potential flows: Uniform stream;Source and Sink;Vortex flow, Doublet,Superposition of basic plane potential flows, Flow past a circular cylinder, Magnus effect;Kutta-Joukowski lift theorem; Concept of lift and drag. | Lectures with Presentation, Seminars | 8 |
| 3 | Laminar Boundary Layers: Boundary layer equations, Boundary layer thickness, Boundary layer on a flat plate, similarity solutions, Integral form of boundary layer equations, Approximate Methods, Flow separation,Entry flow into a duct Elements of Stability Theory: Concept of small-disturbance stability, Orr-Sommerfeld equation, Inviscid stability theory,Boundary layer stability, Thermal instability, Transition to turbulence | Lectures with Presentation, Seminars | 8 |
| 4 | Turbulent Flow: Introduction, Fluctuations and timeaveraging, General equations of turbulent flow, Turbulent boundary layer equation, Flat plate turbulent boundary layer, Turbulent pipe flow, Prandtl mixing hypothesis, Turbulence modeling, Free turbulent flows | Lectures with Presentation, Seminars | 7 |
| 5 | Compressible Flows: Speed of sound and Mach number,Basic equations for one dimensional flows, Isentropic relations, Normal-shock wave, Rankine-Hugoniot relations, Fanno and Rayleigh curve, Mach waves, Oblique shock wave,PrandtlMeyer expansion waves, Quasione dimensional flows, Compressible viscous flows, Compressible boundary layers Introduction to Computational Fluid Dynamics (CFD): Boundary conditions,Basic discretization – Finite difference method, Finite volume method and Finite element method | Lectures with Presentation, Seminars | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Performance of real nozzle | Case Study | BL4-Analyze | 15 |
| 2 | Measurements of boundary layer thickness using numerical & analytical solution | PBL | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Batchelor G.K,An Introduction to Fluid Dynamics, Cambridge University Press, 1983 Frank M. White, Fluid Mechanics, Tata McGraw-Hill, Singapore,Sixth Edition, 2008 |
| **Articles** | https://ocw.mit.edu/courses/2-06-fluid-dynamics-spring-2013/pages/syllabus/ |
| **References Books** | Frank M. White,Viscous Fluid Flow, Third Edition, McGraw-Hill Series of Mechanical Engineering, 2006 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106200/ |
| **Videos** | https://www.youtube.com/watch?v=AirfUsq8aSo&t=160s |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 | 2 | 1 |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 | 1 | 2 |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | 2 | 2 | 1 |
| CO4 | 3 | 1 | 2 | - | - | - | - | - | - | - | 1 | - | 1 | 2 | 1 |
| CO5 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | 1 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Wastewater Treatment and Recycling |
| **Course Code** | CEE0707[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Integrated waste management issues, collection, recovery, reuse, recycling, energy-from-waste, and landfilling**(BL3-Apply)**<br>**CO2-** Analyze & compute the challenges of waste management for smart cities**(BL4-Analyze)**<br>**CO3-** Understand the C&D Waste and E-Waste Management**(BL2-Understand)**<br>**CO4-** Design the generation rates and waste composition material**(BL5-Evaluate)**<br>**CO5-** Perform the role of MSW management within the various initiatives of the Govt. of India including: Swachh Bharat Mission, Smart Cities as well as Make in India**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG6(Clean water and sanitation)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Important terminologies in waste water treatments systems: Sludge, aerobic treatments, anerobic treatments, bioengineering, biosolids, clarifiers, sewers, wetland, retention time, disinfection, influent, effluent, scum, anaerobic digestion, trickling filter, root zone treatment technology | Lectures with problem based learning, experimental learning, case study, | 8 |
| 2 | Sewage and waste water treatments systems: A. Primary treatment methods B. Secondary treatment methods and C. Tertiary treatment methods | Lectures with problem based learning, experimental learning, case study, | 8 |
| 3 | Biotechnological application of hazardous waste management and management of Resources: Use of microbial systems, Waste water treatment using root zone treatment by plants. Reclamation of wasteland: biomass production for Biogas | Lectures with problem based learning, experimental learning, case study, | 7 |
| 4 | Sludge disposal: Sources and effects of sludge on the environment. Methods of sludge disposal | Lectures with problem based learning, experimental learning, case study, | 8 |
| 5 | Wastewater Recycling: Scope and demands; Types and stages of recycling; Recycling requirements; Designated reuse criteria; centralized vs decentralized recycling systems | Lectures with problem based learning, experimental learning, case study, | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Development of Natural Filters for clean water | PBL | BL5-Evaluate | 15 hrs |
| 2 | Development of Biogas chamber model | PBL | BL5-Evaluate | 15 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 12 | 40 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Biotreatment Systems, Volume II ; D.L. Wise Biodegradation and Bioremediation. Academic Press; 2nd edn. Martin Alexander |
| **Articles** | https://www.researchgate.net/publication/375376650_The_Treatment_of_Wastewater_Recycling_and_Reuse_-Past_Present_and_in_the_Future |
| **References Books** | Gabriel Bitton (Author). Wastewater Microbiology, 2nd Edition. Wiley-Liss; 2nd edition (February 16, 1999). |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc21_ce49/preview |
| **Videos** | https://www.youtube.com/watch?v=fHRxhuMQQnE |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | - | - | 2 | 3 | - | - | - | 2 | 2 | 3 | 3 | 3 |
| CO2 | 3 | 2 | 2 | - | - | - | 3 | - | - | - | 2 | 3 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 2 | - | - | 2 | 3 | - | - | - | 3 | 2 | 2 | 2 | 2 |
| CO4 | 2 | 2 | 3 | - | - | 1 | 3 | - | - | - | 2 | 3 | 2 | 2 | 2 |
| CO5 | 3 | 2 | 2 | - | - | 2 | 3 | - | - | - | 2 | 3 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Sustainable Construction Methods |
| **Course Code** | CEE0708[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Student will be able to Classify the sustainable construction materials**(BL2-Understand)**<br>**CO2-** Student will be able to Apply cutting-edge construction technologies**(BL3-Apply)**<br>**CO3-** Student will be able to Evaluate different sustainable construction methods**(BL5-Evaluate)**<br>**CO4-** Student will be able to Apply different rating systems of construction/buildings as a professional**(BL3-Apply)**<br>**CO5-** Student will be able to Apply life cycle approach to optimize the performance of green construction materials **(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Types of foundations and construction methods. Basics of Formwork and Staging. Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls). Modular construction methods for repetitive works | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 2 | Precast concrete construction methods. Basics of Slip forming for tall structures. Basic construction methods for steel structures. Basics of construction methods for Bridges | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 3 | dentification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 4 | Study and evaluation of current LEED and GRIHA rating for construction system. Detailed case study and analysis of highly successful recent "green construction projects". Guidance to students for the LEED Green Associate professional licensing examination | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 5 | Environmental impact of materials; life-cycle assessment; material selection to optimize performance; design, evaluation, and production of green construction materials | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 12 | 40 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Rebecca L. Henn; Andrew J. Hoffman (2013), Constructing Green the Social Structures of Sustainability (Urban and Industrial Environments), MIT Press |
| **Articles** | https://www.researchgate.net/publication/358582436_A_Study_on_Sustainable_Construction_Practices_and_Management |
| **References Books** | Kim S. Elliott, Precast Concrete Structures – 12 June 2019, CRC Press Taylor and Francis |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/102/105102195/ |
| **Videos** | https://www.youtube.com/watch?v=LdHMjhaBWxw |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | - | 1 | 2 | 3 | - | - | - | 1 | 2 | 2 | 2 | 2 |
| CO2 | 3 | 3 | 2 | - | 1 | 1 | 1 | - | - | - | 1 | 2 | 2 | 3 | 2 |
| CO3 | 2 | 2 | 2 | - | - | 2 | 2 | - | - | - | 2 | 2 | 2 | 2 | 3 |
| CO4 | 2 | 2 | 2 | - | 1 | 2 | 1 | - | - | - | 1 | 1 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 2 | - | 1 | 1 | 2 | - | - | - | 1 | 2 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Plastic design of steel structure |
| **Course Code** | CEE0807[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Learn Introduction and basic hypothesis, Virtual work in the elastic-plastic state**(BL2-Understand)**<br>**CO2-** Learn Method of Limit Analysis, applicable to beams basic theorems of limit analysis, rectangular portal frames, gable frames, grids**(BL4-Analyze)**<br>**CO3-** Learn Limit design Principles, and method of combining**(BL5-Evaluate)**<br>**CO4-** Calculate of Deflection in Plastic beams and frames.**(BL5-Evaluate)**<br>**CO5-** Learn Minimum weight Design**(BL5-Evaluate)** | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| M | | | |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Prepare at least one drawing in any CAD software (like AutoCAD) for design of structures conducted in the syllabus | PBL | BL4-Analyze | 15 |
| 2 | Preparation of EXCLE Worksheets for the design of various structural components of Plate Girder/ Gantry Girder/ Foot Over bridge | PBL | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. B G Neal, Plastic Methods of Structural analysis-, 3rd edition, Chapman and hall publications, 1977 2. B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, -Comprehensive Design of Steel Structures, Laxmi Publications (P) Ltd |
| **Articles** | https://www.researchgate.net/publication/359352619_BASICS_AND_CONCEPTS_OF_PLASTIC_DESIGN_OF_STEEL_FRAMES |
| **References Books** | 1. S K Duggal, -Limit state Design of Steel StructuresI,, McGraw Hill education, 2010 2. MR Shiyekar-Limit State Design of Steel StructuresI, PHI Publication, 3rd Edition |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/114/106/114106047/ |
| **Videos** | https://www.youtube.com/watch?v=qJV5zdx7NJs |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 3 | 2 | 2 |
| CO2 | 3 | 3 | 2 | 3 | - | - | - | - | - | - | 2 | 1 | 3 | 1 | 1 |
| CO3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 2 | 2 | 2 |
| CO4 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | 2 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Building Environment & Services |
| **Course Code** | CEE0808[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will learn the importance of durability of civil engineering structures**(BL2-Understand)**<br>**CO2-** Students will be able to detect the defects in foundation, masonry, plastering, Painting, flooring, doors and windows**(BL3-Apply)**<br>**CO3-** Students will be able to provide preventive and remedial measures for Defects**(BL4-Analyze)**<br>**CO4-** Students will be able to locate and place different components like Lifts, electrical panels etc.**(BL4-Analyze)**<br>**CO5-** Students will learn the importance of Need for retrofitting and restoration **(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Durability of civil engineering structures: – Importance of durability – Factors affecting durability of buildings – life expectancy of different classes of buildings. Environmental factors that affect the durability of structures – Effect of natural agents (Air, sun, rain, frost and biological agents such as vegetation & insects) – Environmental pollution – Effect of pollution of air, water and soil – Location effect (Marine, Industrial area etc.) – Usage aspects (Structures subjected to dynamical loading & abrasive condition) - Preventive and remedial measures. Role of maintenance in durability and serviceability of buildings: – Necessity of maintenance – Economic aspects of maintenance. Different types of maintenance – Preventive maintenance – Remedial maintenance – Routine maintenance – Pre-monsoon maintenance - Special maintenance – Planning aspects of maintenance | Lectures with Presentation, Video Lectures | 8 |
| 2 | Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof - Corrosion of reinforcement and steel structures – structural damage due to fire - Causes – Preventive and remedial measures Cracks in buildings – Causes - Preventive and remedial measures | Lectures with Presentation, Practical visits to detect cracks and defects in a building | 8 |
| 3 | Causes - Preventive and remedial measures for Defects in foundation, masonry wooden roof concrete (RCC and PCC) Corrosion of reinforcement and steel structures flooring doors and Painting Defects due to fire, Stair case, water supply system, sewage and sullage system, in drainage system and electrical system Building Services Introduction to other building services | Lectures with Presentation, Practical visits to detect cracks and defects in a building | 8 |
| 4 | Lift – Location – RTT – Number of lifts – lift well and shaft – Machine room. Air conditioning system: Types of A/C – Capacity determination – Requirements for an A/C room. Electrical installations: Panel board & Buss bar, rising mains – distribution boards – MCB – ELCB – DP - TP and change over switch switches - Telephone and TV connectivity – Requirements of domestic gas pipeline | Lectures with Presentation, Case Study on different lift locations | 8 |
| 5 | Retrofitting and restoration of building – Need for retrofitting and restoration – Common retrofitting works carried out – Shoring and underpinning – Different methods of retrofitting and restoration – Challenges in retrofitting and restoration works. Deterioration of monumental and historical buildings – Common causes – Preventive measures – Restoration works – Conservation of world heritages | Lectures with Presentation, Practical visits to provide solutions for cracks and defects in a building | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Plan and draw in detail ventilation and air-conditioning for a given building | PBL | BL3-Apply | 15 |
| 2 | Plan movement facilities: Lifts, escalators, ramps etc. for a given public building | PBL | BL3-Apply | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | S. Champion :Failures and repair of concrete structures ; John Wiley & Sons |
| **Articles** | Philip.H.Perkins: Concrete Structures-repair water proofing and protection; Elsevier Science Ltd |
| **References Books** | B.S.Nayak : A book on Maintenance Engineering ; Khanna Publishers |
| **MOOC Courses** | https://nptel.ac.in/courses/105107156 |
| **Videos** | https://www.youtube.com/watch?v=9hfKdUGWQjQ&t=2s |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | - | - | - | 2 | 2 | 2 | 3 | 3 |
| CO2 | 3 | 2 | 3 | 2 | 1 | 1 | 2 | - | - | - | 2 | 2 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 2 | - | - | 1 | - | - | - | 2 | 2 | 2 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 1 | 1 | - | 2 | - | - | - | 1 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | - | - | - | 2 | 2 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Design of Pre stressed Concrete Structure |
| **Course Code** | CEE0809[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 4 | 1 | 0 | 5 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | basic properties of materials, and steel and Rcc design | | | **Co-Requisite/s** | basic knowledge of structures | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will remember the WSM Method for RCC and Pre-stressed Structures.**(BL1-Remember)**<br>**CO2-** To understand different types and Methods of Pre-stressing.**(BL2-Understand)**<br>**CO3-** Students will be able to apply the knowledge of Pre-stressing on different RCC Structures.**(BL3-Apply)**<br>**CO4-** To analyze Beam for different Profiles of Tendons.**(BL4-Analyze)**<br>**CO5-** To evaluate the stress distribution for different zones of beams**(BL5-Evaluate)**<br>**CO6-** To Create and design a Pre-stressed beam and understand its advantages over RCC**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit 1 | Introduction, Principles of prestressing, Different methods of prestressing – post tensioning and pre-tensioning. Prestressed concrete materials. Need for high strength concrete and High concrete tensile steel. Creep and shrinkage of concrete, relaxation of steel. Losses of prestress friction and anchorage of steel | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit II | Introduction , assumption in plastic analysis Safe moment ,yield moment , plastic moment, shape factor, load factor, moment curvature relationship , collapse load for standard cases, plastic hing length | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| unit III | Stress-pattern in anchorage zones. Transmission length. End zone reinforcement. Stress distribution in end block | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| unit IV | Plastic design of columns for different condition | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit V | Design of R.C.C structures concepts (W.S.M) | Lectures with problem based learning, experimental learning, case study, field trips | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | making model of prestressed beam | PBL | BL4-Analyze | 3 |
| II | making a model of prestressed slabs | PBL | BL5-Evaluate | 2 |
| III | making of model of prestressed coloums | PBL | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Prestress concrete by S S Ramamrutham |
| **Articles** | https://railtec.illinois.edu/wp/wp-content/uploads/Nawy-2009-Prestressed-Concrete.pdf |
| **References Books** | Prestress concrete by Krishna Raju |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/106/105106118/ |
| **Videos** | https://easyengineering.net/design-of-reinforced-concrete-structures-by-ramamrutham/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 2 | 3 | 1 | 1 | 2 | - | - | - | - | 1 | 1 | - |
| CO2 | 1 | 2 | 1 | 1 | 1 | - | 2 | 1 | - | 1 | - | - | 1 | 2 | - |
| CO3 | 2 | 1 | 3 | 1 | - | 1 | - | 1 | - | - | - | 1 | - | - | - |
| CO4 | 1 | 1 | 1 | - | 1 | - | 1 | - | - | 1 | - | 2 | - | 1 | - |
| CO5 | 1 | 2 | 1 | - | 1 | - | 1 | - | - | - | - | 1 | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Traffic Engineering |
| **Course Code** | CEE0810[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 4 | 2 | 0 | 6 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | basic knowledge of traffic and highway engineering | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts in traffic engineering.**(BL1-Remember)**<br>**CO2-** To understand & analyze the traffic engineering problems**(BL2-Understand)**<br>**CO3-** To implement car-following models, queuing theories, and design of traffic signals in traffic engineering.**(BL3-Apply)**<br>**CO4-** To provide experimental basis, and to enable the students to suggest the car-following theory and traffic control measures that will best suit the Indian traffic condition.**(BL4-Analyze)**<br>**CO5-** To evaluate the vehicle, highway and traffic factors that influences the movement of vehicles and design of traffic control measures**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit 1 | Introduction: Role of traffic Engineer, Vehicle, highway and traffic factors. Traffic characteristics, Vehicular Road users, Introduction to Traffic Noise and Air Pollution and remedial measures. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit II | Traffic flow: Interrupted and Uninterrupted Traffic Flow, Highway capacity: Urban, rural and intersection, Capacity of transit system, Traffic flow theory: Car Following and Queuing Theory. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| unit III | Traffic Studies: Traffic volume studies, speeds studies, Speed and Delay Studies, Origin and Destination studies, Accident studies, capacity studies, parking studies. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| unit IV | Traffic Control: regulations and other operational controls, Traffic Signal and marking, street lighting, Traffic Safety: Barricades, delineators. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit V | Design of Intersections: Channelizing islands, Design of Rotaries, Intersection and terminal Design, Parking facilities. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | model of traffic light | PBL | BL2-Understand | 3 |
| II | drawing of pavment marking | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 18 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | Principles of Transportation engineering by CEG Justo & S K Khanna |
| **Articles** | https://archive.nptel.ac.in/courses/105/101/105101008/ |
| **References Books** | Highway Engineering By L R Kadiyali Khanna publication House |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/105/105105215/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 2 | 2 | 1 | - | 2 | 1 | - | - | - | 1 | 1 | - |
| CO2 | 1 | 2 | 1 | 2 | 1 | - | 1 | 1 | 1 | - | - | - | - | - | - |
| CO3 | 2 | 1 | 2 | 1 | - | - | 1 | 2 | 3 | - | - | - | 2 | 1 | - |
| CO4 | 1 | 1 | 1 | 2 | 1 | - | 1 | 1 | - | - | - | - | - | - | - |
| CO5 | 2 | 2 | 1 | - | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Energy Efficient and Green Building |
| **Course Code** | CEE0811[T} |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the concept of Green Buildings**(BL2-Understand)**<br>**CO2-** Analyze & compute the energy flow in buildings**(BL4-Analyze)**<br>**CO3-** Understand the energy efficient buildings**(BL2-Understand)**<br>**CO4-** Design the building as per LEED India Rating System**(BL4-Analyze)**<br>**CO5-** Design an Eco-friendly captive power generation**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building | Lectures with Presentation and Seminar | 8 |
| 2 | Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency | Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures | 8 |
| 3 | Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement | Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures | 8 |
| 4 | Introduction, CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of cooling towers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key feature of the building. Eco-friendly captive power generation for factory,Building requirement | Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures | 8 |
| 5 | Handling of non process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels | Lectures with Microsoft Presentation, Poster Presentations and Interactive Video Lectures | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Eco-friendly captive power generation for ITM University any block | PBL | BL4-Analyze | 20 |
| 2 | Preparing Models of Green Buildings | PBL | BL3-Apply | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009 |
| **Articles** | https://www.researchgate.net/publication/322273339_Energy_Consumption_and_Efficiency_in_Green_Buildings#:~:text=The%20study%20consummates%20that%20as,climate%20changes%20over%20greenhouse%20gases. |
| **References Books** | Green Building Hand Book by Tomwoolley and Samkimings, 2009 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/102/105102195/ |
| **Videos** | https://www.youtube.com/watch?v=LdHMjhaBWxw |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 1 | - | 1 | 2 | - | - | - | 1 | 2 | 2 | 2 | 3 |
| CO2 | 3 | 2 | 3 | 1 | 1 | 1 | 2 | - | - | - | 1 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 2 | 3 | 1 | 1 | 1 | 3 | - | - | - | 2 | 2 | 2 | 2 | 3 |
| CO4 | 3 | 3 | 3 | 2 | - | 1 | 2 | - | - | - | 1 | 2 | 3 | 3 | 3 |
| CO5 | 3 | 2 | 3 | 1 | - | 1 | 3 | - | - | - | 1 | 2 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Airport Engineering |
| **Course Code** | CEE0812[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Describe the different components of airport and aircrafts**(BL2-Understand)**<br>**CO2-** Analyse the requirements of an airport layout with respect to international regulations**(BL4-Analyze)**<br>**CO3-** Explain the airport runway design**(BL4-Analyze)**<br>**CO4-** Design Taxiways & Aprons.**(BL3-Apply)**<br>**CO5-** Summarise the concepts of the terminal service facilities**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | AIR TRANSPORTATION Airport terminology, component parts of Aeroplane, Classification and size of airports; Aircraft characteristics. Air traffic control need for ATC, Air traffic control network, Air traffic control aids –enroute aids, landing aids. Airport site location and necessary surveys for site section, airport obstructions. | Lectures with Presentation, Site Visit to Airport | 8 |
| 2 | PLANNING: Airport master plan –FAA recommendations, Regional Planning, ICAO recommendations, Estimation of future airport traffic needs-layout of Air Port | Lectures with Presentation, Site Visit to Airport | 8 |
| 3 | RUNWAYS: Runway orientation – windrose diagram, basic runway length, corrections for elevation, temperature and gradient, runway geometric design, runway pavement design introduction | Lectures with Presentation, Site Visit to Airport | 8 |
| 4 | TAXIWAYS AND APRONS: Loading aprons –holding aprons –Geometric design standards, exit taxiways – optimal location, design, and fillet and separation clearance | Lectures with Presentation, Site Visit to Airport | 8 |
| 5 | OTHER FACILITIES: Lighting, visual airport marking, airport lighting aids. OPERATIONS AND SCHEDULING: Ground transportation facilities; Airport capacity, runway capacity and delays. | Lectures with Presentation, Site Visit to Airport | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Project On Airport Planning and Design | PBL | BL3-Apply | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Khanna S.K., Arora M.G., Jain S.S., "Airport Planning & Design",1st Edition, Nemch and Bros. Roorkee, 2009 |
| **Articles** | https://www.researchgate.net/publication/228007533_Airport_Engineering_Planning_Design_and_Development_of_21st_Century_Airports_Fourth_Edition |
| **References Books** | Robert Horonjeff, Francis Mc Kelvey, William Sproule and Seth Young, "Planning and Design of Airports" 5th Edition, 2010 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/107/105107123/ |
| **Videos** | https://www.youtube.com/watch?v=WUq3uN4MDms |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 3 | 3 | 2 |
| CO2 | 3 | 2 | 3 | 1 | - | - | - | - | - | - | 3 | 2 | 2 | 2 | 3 |
| CO3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 2 | 3 | 2 | 2 |
| CO4 | 2 | 2 | 1 | 1 | - | - | - | - | - | - | 2 | 2 | 2 | 2 | 3 |
| CO5 | 2 | 2 | 3 | - | - | - | - | - | - | - | 2 | 3 | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Solid Waste Management |
| **Course Code** | CEE0813[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will Understand the concept of solid waste management**(BL2-Understand)**<br>**CO2-** Students will be able to explain handling and processing of solid waste**(BL2-Understand)**<br>**CO3-** Students will be able to apply the concept of landfilling for disposal of solid waste**(BL3-Apply)**<br>**CO4-** Students will be able to design composting and other solid waste conversion units**(BL4-Analyze)**<br>**CO5-** Students will understand the various hazardous waste, risk assessment and legislation **(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG6(Clean water and sanitation)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Solid waste: Public health and ecological impacts, Sources and types of solid wastes, material flow and waste generation, Functional elements: Waste generation, storage, collection, Transfer and transport, processing and recovery, disposal. Physical and chemical composition of municipal solid waste, integrated solid waste management, hierarchy of waste management options, different methods for generation rates. Storage: movable bins, fixed bins. Collection: home to home collection, community bin system. Theory and design of hauled container system, stationary container system | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 2 | Transportation: handcart, tri-cycle, animal cart, tripper truck, dumper placer, bulk refuse carrier, railroad transport, water transport, conveyors, layout of routes. Engineering system for on-site handling and processing of solid waste: separators, size reduction equipments, screening equipments, densification, baling, cubing, pelleting equipments | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 3 | Land filling: Site selection criteria, landfill layout, landfill sections, Occurrence of gases and leachate in landfills: composition and characteristics, generation factors, initial adjustment phase, transition phase, acid formation phase, methane formation phase, maturation phase of gases and leachate, Introduction to engineered landfills | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 4 | Composting, types of composting, process description, design and operational consideration of aerobic composting, process description, design and operational consideration of anaerobic composting. Thermal conversion technologies: incineration and pyrolysis system, energy recovery, system. Overview of solid waste management practices in India | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 5 | Introduction to Hazardous wastes, Definition of Hazardous waste, The magnitude of the problem; Hazardous waste: Risk assessment, Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery, Transportation of hazardous waste, Disposal of hazardous waste. Introduction to Electronic waste and Biomedical waste and their disposal | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Comparative study of different filters for water purification | PBL | BL3-Apply | 15 |
| Module-II | Project on collection and composting of waste | PBL | BL3-Apply | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Tchobanoglous, G., Theisen, H., & Vigil, S.A; Integrated Solid Waste Management: McGraw Hill,New York |
| **Articles** | https://investmeghalaya.gov.in/resources/homePage/17/megeodb/rules/Solid_Waste_Management_Rules.pdf |
| **References Books** | Solid Waste Engineering, Principle & Management issues by Ven Te Chow |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/103/105103205/ |
| **Videos** | https://www.youtube.com/watch?v=cjlacnNRLHE |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | 2 | - | 1 | 2 | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO2 | 2 | 1 | 1 | 1 | - | 1 | 2 | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO3 | 2 | 2 | 2 | 1 | - | 2 | 2 | - | - | - | 1 | 2 | 2 | 2 | 2 |
| CO4 | 3 | 3 | 1 | 1 | - | 1 | 1 | - | - | - | 1 | 1 | 2 | 2 | 1 |
| CO5 | 2 | 2 | 1 | 2 | - | 2 | 2 | - | - | - | 1 | 2 | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Urban Transportation Planning |
| **Course Code** | CEE0814[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will be able to Understand the basic concepts of planning at urban and regional levels**(BL2-Understand)**<br>**CO2-** Students will be able to Distinguish between the Conventional and current approaches for travel demand estimation**(BL4-Analyze)**<br>**CO3-** Students will be able to Implement various types of models and trip generation**(BL3-Apply)**<br>**CO4-** Students will be able to Analyze the urban travel markets**(BL4-Analyze)**<br>**CO5-** Students will be able to Evaluate the transport planning proposals**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to transportation planning, planning concept, Goals, objectives, and Importance of transportation planning. Nature of traffic problems in cities. Present Scenario of road transport and rail transport assets. Role of transportation: Social, Political, Environmental. Transport and Socioeconomic Activities, Historical Development of Transport, Transportation in the Cities, Freight Transportation, Future Developments. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 2 | Urban form and Transport patterns, land use – transport cycle, concept of accessibility. Types of transport systems, evolution of transport modes, transport problems and mobility issues. Public Transport: Intermediate Public Transport (IPT) Rapid and mass transport system like MRTS & bus rapid transit. Transport Planning Process, Problem Definition, Solution Generation | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 3 | Travel demand: Estimation and fore casting, trip classification, trip generation: factor and methods, multiple regression analysis. Trip distribution methods, modal split, trip assignment | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 4 | Studying travel behavior. Analyzing urban travel markets. Traffic and transportation surveys and studies, traffic and travel characteristics, urban transport planning process – stages, study area, zoning, database | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 5 | Evaluation of transport planning proposals: Land Use Transport Planning, Economic Evaluation methods like Net present Value methods, and Benefit Cost method. Transport system management: Long-term and short-term planning | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Traffic Survey of National Highways | PBL | BL4-Analyze | 15 |
| 2 | Parking Planning for given vehicles | PBL | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Metropolitan Transportation planning-J.W. Dickey |
| **Articles** | https://www.tandfonline.com/journals/rupt20 |
| **References Books** | Hutchinson, B.G.(1974).Principles of Urban Transport Systems Planning. Mc Graw Hill Book Company, New York |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/105/105105208/ |
| **Videos** | https://www.youtube.com/watch?v=pW-Qymxabsc |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 2 | 2 | 1 | - | - | - | - | 2 | 2 | 2 | 2 | 3 |
| CO2 | 2 | 2 | 2 | 3 | 2 | 1 | - | - | - | - | 2 | 1 | 2 | 1 | 2 |
| CO3 | 3 | 2 | 2 | 2 | 2 | 1 | - | - | - | - | 2 | 2 | 2 | 1 | 1 |
| CO4 | 3 | 2 | 2 | 3 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO5 | 2 | 3 | 2 | 2 | 1 | 1 | - | - | - | - | 2 | 2 | 1 | 1 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Introduction to Structural Engineering |
| **Course Code** | CEL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | -1 | 1 | 3 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Students must know about various elements and basics of materials | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will get knowledge of Basic Civil Engineering**(BL1-Remember)**<br>**CO2-** To understand the Soil properties, Building elements, Integeration of Techniques**(BL2-Understand)**<br>**CO3-** Students are able to apply knowledge of surveying in field**(BL3-Apply)**<br>**CO4-** To Analyse the different Plannings of building**(BL4-Analyze)**<br>**CO5-** To evaluate the behavior and Structural failure & constructional issues**(BL4-Analyze)**<br>**CO6-** To Complete Determination of Layouts **(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of soil, Preliminary definition and relationships, determination of index properties, classification of soils, soil structure and clay mineralogy, bearing capacity, shear strength, different types of foundations, shallow ,pile, well, machine foundation, site investigation and sub soil exploration, advanced measuring instruments | Experimental learning , case study ,field trips | 8 |
| 2 | Introduction of surveying, Principle of surveying, Reconnaissance, types of surveying, different types of map, Methods of linear measurements, Conventional symbols, Area calculation, Traversing and Triangulation | Experimental learning , case study ,field trips | 8 |
| 3 | Drawing of Building Elements, Drawing of various elements of buildings like different types of door, windows, lintels, arches, staircase, floors and roofs, Building Planning, Principles of Layout, Different types of IS codes and its provision, different types of loads | Experimental learning , case study ,field trips | 9 |
| 4 | Introduction, properties, grades, advantage & disadvantages of concrete, Ingredients of concrete, types of cement, aggregates, water, admixtures, Inspection & testing of materials as per Indian Standard Specifications, bricks, types of bond, destructive and non destructive testing of materials. | Experimental learning , case study ,field trips | 9 |
| 5 | Structural integrity, Physical and performance failure, fatigue failures, failure due to defective materials, failure due to manufacturing errors, failure due to natural disasters, Different types of new structural designing software | Experimental learning , case study ,field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Sieve Analysis of Fine Aggregates | Experiments | BL3-Apply | 2 |
| 2 | Sieve Analysis of Course Aggregates | Experiments | BL3-Apply | 2 |
| 3 | To range the chain line of 40 to 60m | Experiments | BL3-Apply | 2 |
| 4 | Reconnaissance Survey for Index Sketch | Experiments | BL3-Apply | 2 |
| 5 | Drawing of Bars in Beams | Experiments | BL2-Understand | 2 |
| 6 | Drawing of Bars in Columns | Experiments | BL2-Understand | 2 |
| 7 | Specific Surface of Aggregate | Experiments | BL3-Apply | 2 |
| 8 | Samplings of Soil | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | Bhavikatti S.S, Basics Civil Engineering, New Age International Publishers |
| **Articles** | |
| **References Books** | Bansal R.K, Basic Civil Engineering and Engineering Mechanics, Laxmi Publication |
| **MOOC Courses** | https://nptel.ac.in/courses/105106201 |
| **Videos** | https://www.youtube.com/watch?v=CsKddkqgwVk&list=PLyqSpQzTE6M_SM0Lrnzk2dJFwElh0Ebhu |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 2 | 2 | 1 | - | - | - | 2 | 2 | - | 3 | 2 | 2 |
| CO2 | 2 | 2 | 1 | - | - | 2 | - | - | - | 1 | - | 2 | 2 | 2 | 2 |
| CO3 | 2 | 1 | 3 | 1 | 2 | - | - | - | - | 2 | - | - | - | 2 | - |
| CO4 | 1 | 2 | 2 | 3 | - | 1 | - | - | 1 | 1 | 1 | 2 | 3 | 2 | - |
| CO5 | 2 | 1 | 1 | - | 2 | - | 1 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO6 | 1 | 1 | - | 1 | 1 | - | - | - | - | 2 | 2 | - | 2 | - | 1 |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Strength of Materials |
| **Course Code** | CEL0302[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | a complete description of the geometry of the member, its constraints, the loads applied to the member and the properties of the material of which the member is composed. | | | **Co-Requisite/s** | Mechanics | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will revise the concept of Mechanics and Forces **(BL1-Remember)**<br>**CO2-** To understand the basic concept of analysis and design of members subjected to torsion also the analysis and design of structural elements such as columns and struts**(BL2-Understand)**<br>**CO3-** Students are able to Take the Data Concerning strength of various structural elements**(BL3-Apply)**<br>**CO4-** To suggest suitable material from among the available in the field of construction and manufacturing**(BL4-Analyze)**<br>**CO5-** To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts **(BL4-Analyze)**<br>**CO6-** To Complete Determination of SFD, BMD and Deflection of Different Structural Elements**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Simple Stresses & strains: Concept of elastic materials & isotropic materials, various types of stresses & strains, elastic constants, stresses in compound, composite and tapering bars, temperature stresses, Generalized Hooke's law. Complex Stresses & Strains: Two dimensional analyses of stresses and strains with graphical representation. Theory of failure | problem based learning, experimental learning, field trips,case study | 10 |
| 2 | Bending & Shear Stresses: Theory of simple and pure bending. Moment curvature relationship. Distribution of bending and shear stresses across the various sections | problem based learning, experimental learning, field trips,case study | 10 |
| 3 | Deflection computation of determinate beams using Double Integration Methods, Macaulay's Method, Conjugate Beam Method and Moment- Area Method | problem based learning, experimental learning, field trips,case study | 8 |
| 4 | Columns & Struts: Euler's theory of buckling of columns with different end conditions, Effective Length, slenderness ratio, Rankine Formulae, Eccentric loading on columns, slender column. | problem based learning, experimental learning, field trips,case study | 8 |
| 5 | Unsymmetrical Bending & Shear Center: Bending of a beam in a plane which is not a plane of symmetry. Shear center, Curved beams: Pure bending of curved beams of rectangular, circular I sections, Stress distribution and position of neutral axis. | problem based learning, experimental learning, field trips,case study | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Comparative study of tensile strength of different types of steel | PBL | BL4-Analyze | 10 |
| 2 | Comparative study of hardness of steel with other available materials | PBL | BL4-Analyze | 10 |
| 3 | To study the mechanical Properties of metals | Experiments | BL4-Analyze | 2 |
| 4 | To perform torsion test on mild steel rod | Experiments | BL3-Apply | 2 |
| 5 | To determined impact strength of steel (charpy test) | Experiments | BL4-Analyze | 2 |
| 6 | To determined impact strength of steel (izod test) | Experiments | BL4-Analyze | 2 |
| 7 | To determine brinell hardness numbers for mild steel | Experiments | BL5-Evaluate | 2 |
| 8 | To determine the rock well hardness numbers for steel | Experiments | BL4-Analyze | 2 |
| 9 | To determine the tensile strength of mild steel | Experiments | BL4-Analyze | 2 |
| 10 | Analysis of simply supported beam with ANSYS | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Timushenko. S. P. and Young, Strength of Material, East-West Press |
| **Articles** | https://www.google.co.in/books/edition/A_Textbook_of_Strength_of_Materials/2IHEqp8dNWwC?hl=en&gbpv=1&dq=strength+of+materials&printsec=frontcover |
| **References Books** | R K Bansal, Strength of Material, Laxmi Publication |
| **MOOC Courses** | https://nptel.ac.in/courses/112106141 |
| **Videos** | https://www.youtube.com/watch?v=8CP714_wKVk |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 3 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 3 | 2 | - | - | - | - | - | - | 2 | 2 | 1 | - | 2 | 3 | 2 |
| CO4 | 1 | 2 | 2 | 2 | 2 | - | 2 | 2 | - | - | 2 | 1 | 3 | 2 | 3 |
| CO5 | 2 | 2 | 1 | - | - | - | - | 1 | 2 | 1 | 2 | - | 2 | 2 | 3 |
| CO6 | 3 | 2 | 2 | 1 | - | - | - | 1 | 2 | 2 | 2 | - | 2 | 3 | 2 |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Concrete Technology |
| **Course Code** | CEL0303[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Students must have knowledge of Structural Materials | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts in theory of Construction materials**(BL1-Remember)**<br>**CO2-** To understand & analyze the different function of ingredients of concrete**(BL2-Understand)**<br>**CO3-** To implement the different designing concrete mix design**(BL3-Apply)**<br>**CO4-** To provide experimental basis, and to enable the students to analyze and test the concrete properties **(BL4-Analyze)**<br>**CO5-** To evaluate the applications of different special types of concrete**(BL5-Evaluate)**<br>**CO6-** To apply the understanding of destructive and non destructive testing of concrete**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Stones: Occurrence, varieties, Characteristics and their testing, uses, quarrying and dressing of stones. Timber: Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment. Brick and Tiles: Manufacturing, characteristics, classification and uses, improved brick from inferior soils. Flooring tiles and other tiles. | lecture with problem based learning, experimental learning, field trips,case study | 10 |
| 2 | Miscellaneous Construction Materials: Use of fly ash in mortars, lime, Fly ash bricks, Stabilized mud blocks, D.P.C. materials, Building materials made by industrial & agricultural wastes, clay products, P.V.C. materials, advance materials for flooring, doors & windows, Aluminum & glass composites. | lecture with problem based learning, experimental learning, field trips,case study | 10 |
| 3 | Concrete: Introduction: classification, properties, grades, advantage & disadvantages of concrete. Ingredients of concrete, manufacturing and types of cement, aggregates, water and admixtures. Properties of Fresh and Hardened Concrete: Workability-Testing of fresh concrete, Compressive & Tensile strength Characteristics of hardened concrete: Shrinkage and Creep of concrete temperature effects, durability, | lecture with problem based learning, experimental learning, field trips,case study | 10 |
| 4 | Design of Concrete Mix: Introduction, Various classical methods of concrete mix design , Mix design using I.S. code method-basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete. Production and Quality Control of Concrete, curing at different temperatures. field control, Inspection & Testing of Concrete | lecture with problem based learning, experimental learning, field trips,case study | 8 |
| 5 | Special Concrete : Brief Introduction of Concreting underwater, hot & cold weather condition, Light weight concrete, Ready mix concrete, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Rubble concrete, Resin concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete. | lecture with problem based learning, experimental learning, field trips,case study | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To determine the water absorption, compressive strength and efflorescent effect of brick | Experiments | BL5-Evaluate | 3 |
| 2 | To determine the normal consistency, initial and final setting time of cement | Experiments | BL4-Analyze | 3 |
| 3 | To determine the soundness of cement | Experiments | BL3-Apply | 3 |
| 4 | To determine the bulking of sand | Experiments | BL3-Apply | 3 |
| 5 | To determine the compressive strength of cement mortar | Experiments | BL5-Evaluate | 3 |
| 6 | To determine the density & water absorption of aggregates | Experiments | BL4-Analyze | 3 |
| 7 | To determine the workability of concrete by slump cone test/ compaction factor test | Experiments | BL4-Analyze | 3 |
| 8 | To determine the compressive strength of concrete cube | Experiments | BL5-Evaluate | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 30 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | 1. S.C. Rangwala - Engineering Materials. , 2. Varshney RS - Concrete Technology; Oxford& IBH publishing co. 3. M S Shetty - Concrete Technology. |
| **Articles** | https://civiltechnicalguruji.wordpress.com/wp-content/uploads/2018/07/advanced-concrete-technology-zongjin-li.pdf |
| **References Books** | M S Shetty - Concrete Technology. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/102/105102012/ |
| **Videos** | https://civiltechnicalguruji.wordpress.com/wp-content/uploads/2018/07/advanced-concrete-technology-zongjin-li.pdf |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | 1 | - | - | - | - | - | 2 | 2 | 3 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 2 | 1 | - | - | - | - | - | 2 | 2 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | 3 | 2 | 2 | 3 | 2 |
| CO4 | 3 | 2 | 3 | 2 | 2 | - | - | - | 1 | 2 | 2 | 3 | 3 | 2 | 2 |
| CO5 | 3 | 3 | 2 | 2 | 2 | - | - | - | 2 | 2 | 3 | 2 | 3 | 3 | 3 |
| CO6 | 3 | 2 | 3 | 3 | - | - | - | - | 1 | 1 | 2 | 3 | 3 | 2 | 2 |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Highway and Traffic Engineering |
| **Course Code** | CEL0313[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basics of Materials | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will be able to get Awareness about the road planning & Traffic problems of the country.**(BL1-Remember)**<br>**CO2-** To introduce the knowledge of Highway Planning**(BL1-Remember)**<br>**CO3-** Students are able to have knowledge of Highway Planning, Alignment, Construction & maintenance of roads**(BL2-Understand)**<br>**CO4-** To knowledge of Traffic Jamming & its solutions on Highways & Minimize The numbers of road accidents**(BL2-Understand)**<br>**CO5-** To design Highways**(BL3-Apply)**<br>**CO6-** To be able to construct roads**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG5(Gender equality)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG10(Reduced inequalities)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production)<br>SDG13(Climate action)<br>SDG14(Life below water)<br>SDG15(Life on land)<br>SDG17(Partnerships for the goals) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | High way planning, Alignment & Geometric Design: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location. | Experimental learning , case study ,field trips,problem based learning | 10 |
| 2 | Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, numerical problems. | Experimental learning , case study ,field trips,problem based learning | 10 |
| 3 | Bituminous & Cement Concrete Payments: Design of flexible pavements, Design of Rigid pavements using IRC charts WBM, , surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars | Experimental learning , case study ,field trips,problem based learning | 8 |
| 4 | Low Cost Roads, Drainage of Road and testing: Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures, highway materials, properties and testing, Channelized and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages. Evaluation and maintainance of pavements. | Experimental learning , case study ,field trips,problem based learning | 9 |
| 5 | Traffic Characteristics: road user‹s Characteristics-general human characteristics, physical, mental and emotional factors, factor affecting reaction time, PIEV theory, vehicular characteristics: characteristics affecting road design width, height, length, and other dimensions. Weight, power, speed and breaking capacity of a vehicle. Traffic studies: - spot speed studies and volume studies, speed and delay studies purpose, causes of delay, method of conducting speed and delay studies. Origin and destination studies: various method, collection and interpretation of data. Traffic capacity studies: volume, density, Mass transportation. | Experimental learning , case study ,field trips,problem based learning | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | CBR Test | Experiments | BL3-Apply | 2 |
| 2 | Abrasion Test | Experiments | BL3-Apply | 2 |
| 3 | Impact Test | Experiments | BL4-Analyze | 2 |
| 4 | Specific Gravity Test | Experiments | BL2-Understand | 2 |
| 5 | Bitumen Adhesion | Experiments | BL4-Analyze | 2 |
| 6 | Penetration Test | Experiments | BL3-Apply | 2 |
| 7 | Viscosity Test | Experiments | BL4-Analyze | 2 |
| 8 | Ductility Test | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Khanna S. K. , Justo C. E. G. Highway & Traffic Engineering, Nem Chand Publishers |
| **Articles** | https://www.google.co.in/books/edition/Highway_Engineering/86QEEAAAQBAJ?hl=en&gbpv=1&dq=justo+khanna&printsec=frontcover |
| **References Books** | Kadiyali L.R, Highway Engineering, Khanna Publications |
| **MOOC Courses** | https://nptel.ac.in/courses/105105107 |
| **Videos** | https://www.youtube.com/watch?v=k117-foOK_Y&list=PLk7ptZcl9vmgQsUoS5XcIIoFVi383V6E9 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | - | - | - | - | - | 2 | 3 | - | 2 | 3 | 2 | 2 |
| CO2 | 3 | 2 | 2 | 2 | - | - | - | - | 2 | - | - | - | 3 | 2 | 2 |
| CO3 | 2 | 3 | 1 | 1 | - | - | - | - | 1 | 2 | 1 | - | 2 | 2 | 2 |
| CO4 | 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 | 2 |
| CO5 | 3 | 2 | 2 | 2 | - | - | - | - | 2 | 2 | - | - | 3 | 3 | 2 |
| CO6 | 3 | 2 | 2 | 3 | 1 | - | - | - | - | 2 | - | 1 | 3 | 1 | 1 |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Elementary design of structures (RCC) |
| **Course Code** | CEL0331[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basics of Materials Properties and Knowledge of Mechanics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will be able to get knowledge about Structural Members**(BL1-Remember)**<br>**CO2-** To introduce the knowledge of Beams and Slab Designs**(BL2-Understand)**<br>**CO3-** Students are able to understand yield Line theory of Slabs**(BL2-Understand)**<br>**CO4-** To analyze the concept of Soft Storey**(BL4-Analyze)**<br>**CO5-** To Apply Codal Provision in designing methods**(BL3-Apply)**<br>**CO6-** To be able to create different basic elements of a building**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. | Experimental learning , case study ,field trips,problem based learning | 10 |
| 2 | Design of Beams: Singly & Doubly reinforced sections | Experimental learning , case study ,field trips,problem based learning | 8 |
| 3 | Design of Slabs: One way slab, Two way slab, Yield line theory | Experimental learning , case study ,field trips,problem based learning | 8 |
| 4 | Concept of Soft Storey: Mechanism of load transfer in soft storey, Stiffness and Stability criteria, Design problems | Experimental learning , case study ,field trips,problem based learning | 8 |
| 5 | Design and drawing details of the various RCC structures, Discussion of Codal provisions of IS 456-2000, SP-16. | Experimental learning , case study ,field trips,problem based learning | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Patterns of Reinforcements in Beams | Experiments | BL3-Apply | 2 |
| 2 | Patterns of Reinforcements in Columns | Experiments | BL3-Apply | 2 |
| 3 | Patterns of Reinforcements in Slabs | Experiments | BL3-Apply | 2 |
| 4 | Types of Beams | Experiments | BL2-Understand | 2 |
| 5 | Types of Columns | Experiments | BL2-Understand | 2 |
| 6 | Types of Slab | Experiments | BL2-Understand | 2 |
| 7 | Drawings of Beams in AutoCad | Experiments | BL4-Analyze | 2 |
| 8 | Drawings of Columns in AutoCad | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. B.C. Punmia Ashok Kumar Jain, RCC Designs, Laxmi Publication 2. A.K. Jain, Reinforced Concrete: Limit State Design, Nem Chand & Brothers |
| **Articles** | https://www.google.co.in/books/edition/Reinforced_Concrete_Structures_Vol_I/6g1fu4pRDCkC?hl=en&gbpv=1&dq=design+of+rcc+structures&printsec=frontcover |
| **References Books** | N.Krishnaraju, Design of R.C structures, CBS Publishers and distributors |
| **MOOC Courses** | https://nptel.ac.in/courses/105105104 |
| **Videos** | https://www.youtube.com/watch?v=x2_W127EFrU&list=PLH1Yxo6h9TZk49Yx84IbpJeYfe87Kt69I |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 2 | 3 | 2 |
| CO2 | 1 | - | 1 | 1 | 1 | 2 | - | - | 2 | 3 | - | - | 3 | 2 | 2 |
| CO3 | - | - | 2 | 1 | - | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | - | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO5 | - | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 1 | 2 |
| CO6 | - | 1 | - | 2 | 2 | 2 | - | - | 2 | - | - | - | 2 | 2 | 1 |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Building Planning and Drawing |
| **Course Code** | CEL0333[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Students must have basic knowledge of Engineering Graphics and Building Elements | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To Remember basic fundamentals of building Design**(BL1-Remember)**<br>**CO2-** To Understand the concept of drawing basic elements of buildings**(BL2-Understand)**<br>**CO3-** To Analyse different techniques for different views of building**(BL4-Analyze)**<br>**CO4-** To apply knowledge of different plans on real life building strutures**(BL3-Apply)**<br>**CO5-** To develop plans of superstructure and substructure details of a building**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Appreciate types of Drawings and its importance, Draw various types of Projections. Use building drawing Symbols, Conventions, and Abbreviations, Apply various types of scales as per needs. | problem based learning, experimental learning,case study | 5 |
| 2 | Apply the Bye-laws and Principles of Planning for residential and other public buildings. | problem based learning, experimental learning,case study | 6 |
| 3 | Develop concept plan of buildings, Prepare detail drawings for single and two storied residential building and public building | problem based learning, experimental learning,case study | 8 |
| 4 | Generate perspective view of simple building by different methods, Develop building models | problem based learning, experimental learning,case study | 5 |
| 5 | Draw details of parts of buildings, provide scope and provisions for building components and services | problem based learning, experimental learning,case study | 4 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Interpretation of building drawings approved under local authority | Experiments | BL2-Understand | 2 |
| 2 | Draw symbols , conventions and Abbreviations in sketch book | Experiments | BL2-Understand | 2 |
| 3 | Study of building by-laws act and national building code (NBC) | Experiments | BL3-Apply | 2 |
| 4 | Draw detail plan on drawing sheet - 1 plan ,elevation and section of existing building (actual Measurement Drawing) | Experiments | BL3-Apply | 2 |
| 5 | Draw detail of foundation plan of one room building /two room building in sketch book | Experiments | BL4-Analyze | 2 |
| 6 | Draw working drawings sheet -2 for single storied residential building (bunglow)on 250sq.m plot with scale and show following detail: GF & FF plan with elevation, section and opening schedule | Experiments | BL4-Analyze | 2 |
| 7 | Prepare concept plan of any one other type of building considering local bye laws: high school building, Shopping centre, Hospital and Industrial Building in sketch book. | Experiments | BL4-Analyze | 2 |
| 8 | Develop perspective view of single room residential building with verandah & steps by any methods. | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | R. S. Malek G. S. Meo, Civil Engineering Drawing, New Asian Delhi |
| **Articles** | https://www.hitechcaddservices.com/news/types-of-building-drawings/ |
| **References Books** | B. H. Shukla, Civil Engineering Drawing, Atul Prakashan Ahmedabad |
| **MOOC Courses** | https://www.mooc-list.com/course/3d-cad-application-coursera |
| **Videos** | https://www.youtube.com/watch?v=abr2elb24Ps&list=PLAhtOl5kcFk2sgnaaZQaTfqEpd3G5iY6B |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | - | - | 2 | 2 | 1 | - | - | 2 | 2 | 2 | 1 | - | - |
| CO2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | - | - | - | 2 | 2 | 3 | 3 | 3 |
| CO3 | 2 | 1 | 2 | - | - | - | 2 | 2 | - | - | - | 2 | 3 | - | 3 |
| CO4 | 1 | 2 | 2 | 3 | 2 | - | 2 | 1 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | 1 | - | - | 1 | - | - | 1 | - | - | - | - | 1 | - | 1 | 2 |
| CO6 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Building Planning and Drawing |
| **Course Code** | CEL0333[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Students must have basic knowledge of Engineering Graphics and Building Elements | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To Remember basic fundamentals of building Design**(BL1-Remember)**<br>**CO2-** To Understand the concept of drawing basic elements of buildings**(BL2-Understand)**<br>**CO3-** To Analyse different techniques for different views of building**(BL4-Analyze)**<br>**CO4-** To apply knowledge of different plans on real life building strutures**(BL3-Apply)**<br>**CO5-** To develop plans of superstructure and substructure details of a building**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Appreciate types of Drawings and its importance, Draw various types of Projections. Use building drawing Symbols, Conventions, and Abbreviations, Apply various types of scales as per needs. | problem based learning, experimental learning,case study | 5 |
| 2 | Apply the Bye-laws and Principles of Planning for residential and other public buildings. | problem based learning, experimental learning,case study | 6 |
| 3 | Develop concept plan of buildings, Prepare detail drawings for single and two storied residential building and public building | problem based learning, experimental learning,case study | 8 |
| 4 | Generate perspective view of simple building by different methods, Develop building models | problem based learning, experimental learning,case study | 5 |
| 5 | Draw details of parts of buildings, provide scope and provisions for building components and services | problem based learning, experimental learning,case study | 4 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Interpretation of building drawings approved under local authority | Experiments | BL2-Understand | 2 |
| 2 | Draw symbols , conventions and Abbreviations in sketch book | Experiments | BL2-Understand | 2 |
| 3 | Study of building by-laws act and national building code (NBC) | Experiments | BL3-Apply | 2 |
| 4 | Draw detail plan on drawing sheet - 1 plan ,elevation and section of existing building (actual Measurement Drawing) | Experiments | BL3-Apply | 2 |
| 5 | Draw detail of foundation plan of one room building /two room building in sketch book | Experiments | BL4-Analyze | 2 |
| 6 | Draw working drawings sheet -2 for single storied residential building (bunglow)on 250sq.m plot with scale and show following detail: GF & FF plan with elevation, section and opening schedule | Experiments | BL4-Analyze | 2 |
| 7 | Prepare concept plan of any one other type of building considering local bye laws: high school building, Shopping centre, Hospital and Industrial Building in sketch book. | Experiments | BL4-Analyze | 2 |
| 8 | Develop perspective view of single room residential building with verandah & steps by any methods. | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | R. S. Malek G. S. Meo, Civil Engineering Drawing, New Asian Delhi |
| **Articles** | https://www.hitechcaddservices.com/news/types-of-building-drawings/ |
| **References Books** | B. H. Shukla, Civil Engineering Drawing, Atul Prakashan Ahmedabad |
| **MOOC Courses** | https://www.mooc-list.com/course/3d-cad-application-coursera |
| **Videos** | https://www.youtube.com/watch?v=abr2elb24Ps&list=PLAhtOl5kcFk2sgnaaZQaTfqEpd3G5iY6B |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | - | - | 2 | 2 | 1 | - | - | 2 | 2 | 2 | 1 | - | - |
| CO2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | - | - | - | 2 | 2 | 3 | 3 | 3 |
| CO3 | 2 | 1 | 2 | - | - | - | 2 | 2 | - | - | - | 2 | 3 | - | 3 |
| CO4 | 1 | 2 | 2 | 3 | 2 | - | 2 | 1 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | 1 | - | - | 1 | - | - | 1 | - | - | - | - | 1 | - | 1 | 2 |
| CO6 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Fluid Mechanics |
| **Course Code** | CEL0406[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | subject knowledge of engineering mechanics and physics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts of fluid mechanics**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different fluid flow problems.**(BL2-Understand)**<br>**CO3-** • CO3: To implement the different designing concepts of fluid mechanics.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis ,and to enable the students to analyze the behaviour of various in fluids and its characterstics.**(BL4-Analyze)**<br>**CO5-** • CO5: To evaluate the applications of fluids in various fields such as research&industries.**(BL4-Analyze)**<br>**CO6-** • CO6: To apply the understanding of fluids in identifying the fluids and its different types.**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Characteristics of fluids; continum concepts; physical properties – bulk modulus; cohesionand adhesion; vapor pressure; surface tension; Newton's Law of viscosity – Newtonian and Non-Newtonian fluids; Pascal's law; pressure variation; scales and methods of pressure measurement; forces acting on plane and curve surfaces; stability of floating and submerged bodies. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| Unit-2 | Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & non-uniform, one, two dimensional flow, path lines, streak lines, streamlines and stream tubes; continuity equation for one dimensional flow, rotational &irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flownets& Utility. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| Unit-3 | Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation.Forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, current meters etc); flow measurement (orifices, nozzles, mouth pieces, venturimeter). | Lectures with problem based learning, experimental learning,case study,field trips, | 10 |
| UNit-4 | Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles, Major & minor head losses in pipe. | Lectures with problem based learning, experimental learning,case study,field trips, | 8 |
| Unit-5 | Dimensional Analysis: Introduction, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, application of similarity laws to model & prototype. Machines:Introduction to different types of turbines and Pumps Pelton, Francis and Kaplan Turbine, Centrifugal Pumps: Reciprocating Pump | Lectures with problem based learning, experimental learning,case study,field trips, | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2 | To determine Cv, Cc and Cd for orifice meter | Experiments | BL3-Apply | 3 |
| 3 | To determine Cv, Cc and Cd for venturi meter | Experiments | BL2-Understand | 3 |
| 4 | Find the losses due to friction in pipe | Experiments | BL4-Analyze | 3 |
| 5 | Find the losses due to pipe fitting. | Experiments | BL2-Understand | 3 |
| 6 | Find the Cd for Nozzle meter. | Experiments | BL3-Apply | 3 |
| 7 | Find the meta-centric height. | Experiments | BL2-Understand | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | Dr. R.K. Bansal |
| **Articles** | https://books.google.co.in/books?id=0clZbfwgiyUC&printsec=copyright&redir_esc=y#v=onepage&q&f=false |
| **References Books** | Modi and Seth |
| **MOOC Courses** | https://www.mooc-list.com/tags/fluid-mechanics#google_vignette |
| **Videos** | https://www.youtube.com/watch?v=PgKsr2_-oxc |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 3 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 3 | 1 | - | 1 | 3 | 3 | - | - | 3 | 3 | 1 |
| CO3 | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | 3 | 2 | 2 | - | 3 | 2 | - | - | 2 | 1 | 3 | 2 | 2 |
| CO5 | 1 | 1 | 1 | 2 | - | 1 | - | - | - | - | - | - | - | - | - |
| CO6 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Fundamentals of Surveying |
| **Course Code** | CEL0407[T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | subject knowledge of linear measurement, geometry | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1:To remember the various concepts of surveying.**(BL1-Remember)**<br>**CO2-** • CO2:To understand & analyze the horizontal vertical & inclined measurements.**(BL2-Understand)**<br>**CO3-** • CO3:To implement the different instrumentation techniques.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis,and to enable the studentstoanalyzetheRLs of different levels.**(BL4-Analyze)**<br>**CO5-** • CO5:To evaluate the land areas & volume of earth work.**(BL5-Evaluate)**<br>**CO6-** • CO6: To apply the understand inglocation of of fininte points **(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Principles and classifications of surveying, chain surveying- basic concepts, terminology and instruments used. Plane table surveying: Principle, methods and equipments, two and three point problems and their solutions Leveling: Principle, terminology and instrumentation, booking of leveling readings, reduction of levels, profile leveling, cross-sectioning and reciprocal leveling. Contouring | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 2 | Traversing by Compass: different types of bearings and their measurement systems, Different types of compasses for the measurement of bearings, compass traversing and closing error and its adjustments. Traversing by theodolite, Field work checks, traverse computations, latitude and departures, plotting & adjusting of traverse, omitted measurements. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 3 | Tachometry: Tachometric systems and principles, uses of anallatic lens, tangential system,subtense system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring. Trigonometrical leveling. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 4 | Curves: Classification and use; elements of circular curves, calculations, setting outCurves by offsets and by theodolites, compound curves, reverse curves, transition curves,Vertical curves Introduction to DGPS | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 5 | Control Surveys: Providing frame work of control points, triangulation principle,Reconnaissance, selection and marking of stations, angle measurements and corrections, baseline Measurement and corrections, computation of sides, precise traversing, Introduction & principlesof hydrographic survey. | Lectures with problem based learning, experimental learning,case study,field trips | |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | chain surveying | Experiments | BL3-Apply | 3 |
| 2 | compass surveying | Experiments | BL3-Apply | 3 |
| 3 | dumpy level | Experiments | BL2-Understand | 3 |
| 4 | plane table survey | Experiments | BL2-Understand | 3 |
| 5 | auto level survey | Experiments | BL3-Apply | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | N.N. Basak |
| **Articles** | https://books.google.co.in/books/about/Surveying_Vol_I.html?id=EM-sLyVmMwIC&redir_esc=y |
| **References Books** | Dr. B.C. Punmia |
| **MOOC Courses** | https://www.mooc-list.com/tags/surveys |
| **Videos** | https://www.youtube.com/watch?v=chhuq_t40rY |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 1 | 3 | 2 | 2 | 2 | 1 | 1 | - | - | 3 | 2 | 1 |
| CO2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 3 | - | 3 | 3 | 1 |
| CO3 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 1 | 2 | - | 2 | 3 | 3 | 1 |
| CO5 | 1 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | - | - |
| CO6 | 1 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Fundamentals of Geotechnical Engineering |
| **Course Code** | CEL0408[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | basic knowledge of soil and its properties | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To remember the various concepts in theory of geotechnical engineering.**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different geotechnical engineering problems.**(BL2-Understand)**<br>**CO3-** • CO3: To implement the shear strength parameters, consistency limits used in geotechnical engineering.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to suggest the type of shear tests to be conducted depending on soil conditions and the type of earth pressure depending on the wall conditions.**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the stress distribution in soils and stability of slopes. **(BL5-Evaluate)**<br>**CO6-** • CO6: To apply the understanding of index properties of soil, stress distribution and flow net in soil in solving problems of type of stresses in soil and compressibility and consolidation theories in soil. **(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behaviour. Soil structure. Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 2 | Soil Water and Consolidation: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flow nets, uses of a flownet,calculation of stresses. Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of preconsolidation pressure, settlement analysis. Calculation of total settlement. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 3 | Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. Newmark's influence chart. Contact pressure distribution. Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 4 | Slopes and stabilization of soil. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams. STABILIZATION OF SOIL: Introduction, Mechanical stabilization, Cement stabilization, Lime stabilization, Bituminous stabilization, Chemical stabilization, Thermal stabilization, Electrical stabilization, Stabilization by grouting, Use of geo-synthetic materials, Types, Functions and applications of geo-synthetics, Reinforced earth structures-components and construction. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 5 | Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cosion-less and cohesive soils. Effect of surcharge, water table and wallfriction. Arching in soils. Reinforced earth retaining walls. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | casagrande apparatus | Experiments | BL2-Understand | 3 |
| 2 | permeability test | Experiments | BL3-Apply | 3 |
| 3 | sieve analysis | Experiments | BL2-Understand | 3 |
| 4 | water content | Experiments | BL2-Understand | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |

Part E

| | |
|---|---|
| **Books** | Gopal Ranjan and Rao |
| **Articles** | https://books.google.com.na/books?id=U2AvQrA6l4sC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false |
| **References Books** | Dr. B.C.Punmia |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_ce74/preview |
| **Videos** | https://www.youtube.com/watch?v=V1m3cB-Aqy8 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | 2 | 2 | - | 3 | 3 | 1 | 2 | 2 | 3 | 3 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 2 | 2 | - | 2 | 2 | 3 | 1 | 3 | 2 | 3 | 3 |
| CO3 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | 2 | 3 | 2 | 3 | - | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| CO5 | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Basic Methods of Structural Analysis |
| **Course Code** | CEL0409[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | basic knowledge of structure | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: Toremembertheconcept of SFD and BMD.**(BL1-Remember)**<br>**CO2-** • CO2:Tounderstand & analyze the Rolling Loads.**(BL2-Understand)**<br>**CO3-** • CO3:To implement and analyze the different theorems on Beams **(BL4-Analyze)**<br>**CO4-** • CO4:Toanalyze the sway portal frames**(BL4-Analyze)**<br>**CO5-** • CO5:ToevaluatetheArches and their thrust conditions.**(BL5-Evaluate)**<br>**CO6-** • CO6:Tocreate appropriate loading conditions for different complex and indeterminate structures**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Strain Energy in tension, compression, torsion and bending, Castigliano's theorems, virtual work principles, Force analysis of Compound and complex trusses, Tension co-efficient method – application to simple space trusses. Deflection of determinate pin jointed frames using Castigliano's theorem, principle of virtual work, Unit load method & Graphical method (Williot- Mohr diagram) | Lectures with problem based learning, experimental learning,case study, | 10 |
| 2 | Rolling loads and influence lines: Maximum S.F. and B.M curves for various types of rolling loads, focal length , EUDL, influence lines for shear force and bending moment for determinate beams. Influence lines for member forces in pin jointed trusses & arches. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 3 | Two & Three hinged arches, cables and suspension bridges, Unstiffened & stiffened, Eddy's theorem, fixed arches. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 4 | Analysis of Indeterminate Structures: Statistical and kinematic indeterminacy, stability of structures. Analysis of fixed and continuous beams by three-moment theorem, Method of consistent deformation and energy methods. slopes and deflections of statically Indeterminate beams | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 5 | Analysis of non sway frames by moment distribution and slope deflection methods and energy method, Effect of sinking of support | Lectures with problem based learning, experimental learning,case study,field trips | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2 | | PBL | | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Wang C.K |
| **Articles** | https://www.scribd.com/document/466472190/Intermediate-Structural-Analysis-Wang-pdf |
| **References Books** | Kinney Streling J-Addison Wesley |
| **MOOC Courses** | https://www.mooc-list.com/tags/structural-engineering |
| **Videos** | https://www.youtube.com/watch?v=cRG8UbzMTdk |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 1 | 1 | 3 | 2 | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 1 |
| CO2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 1 | 3 | 2 | 3 | 3 |
| CO3 | 1- | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | 2 | 3 | 2 | 3 | - | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Elementary Design of Structures (Steel) |
| **Course Code** | CEL0432[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basics of Autocad, Limit State Design and Working Stress Method | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember basic types of loading and steel structures**(BL1-Remember)**<br>**CO2-** To understand different types of connections in steel members**(BL2-Understand)**<br>**CO3-** To implement the knowledge of IS Code for Structural Design of Steel members**(BL3-Apply)**<br>**CO4-** To Design different members like flexural and compression**(BL2-Understand)**<br>**CO5-** To evaluate the different loading conditions according to different connections**(BL2-Understand)**<br>**CO6-** To Create a Structural member fir for Different Loading Conditions**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, design of structural connections- bolted, riveted and welded connections. | Lectures with problem based learning, experimental learning,case study,field trips | 8 |
| 2 | Design of Bolted and Riveted Connections | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 3 | Design of Welded Connections. | Lectures with problem based learning, experimental learning,case study,field trips | 8 |
| 4 | Design of Tension members and bracing systems. | Lectures with problem based learning, experimental learning,case study,field trips | 10 |
| 5 | Design of Compression members. | Lectures with problem based learning, experimental learning,case study,field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Analysis of different compressive strength of column for different sizes | PBL | BL4-Analyze | 3 |
| 2 | Tensile structure using steel chain connections | PBL | BL6-Create | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |

Part E

| | |
|---|---|
| **Books** | S.K. Duggal, Steel Structure, T.M.H Publication |
| **Articles** | https://pdfcoffee.com/design-of-steel-structure-3rd-edition-by-s-k-duggal-4-pdf-free.html |
| **References Books** | S.S. Bhavikatti, Design of Steel Structure, Vikas Publication |
| **MOOC Courses** | https://www.my-mooc.com/en/mooc/introduction-steel-tenarisuniversity-steel101x-1/ |
| **Videos** | https://www.youtube.com/watch?v=_sG6L8Abfss |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 3 | 3 | 1 | 2 | - | 2 | - | - | 2 | 3 | - | - | 2 | 2 | 1 |
| CO3 | 2 | 2 | 2 | - | - | - | - | - | 2 | 1 | - | - | 1 | - | 1 |
| CO4 | 1 | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 2 | - | 2 |
| CO5 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | 2 | 2 | - | - | 1 | 2 | 1 |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Hydraulics & fluid machine |
| **Course Code** | CEL0510[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Students should have the knowledge of basic concepts of Fluid Mechanics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To remember the various concepts of fluid machines.**(BL1-Remember)**<br>**CO2-** CO2: To understand & analyze the different fluid flow problems.**(BL2-Understand)**<br>**CO3-** CO3: To implement the different designing concepts of fluid machines.**(BL3-Apply)**<br>**CO4-** CO4: To provide experimental basis, and to enable the students to analyze the working of various machines and its different components.**(BL4-Analyze)**<br>**CO5-** CO5: To evaluate the applications of fluids in various fields such as research & industries.**(BL5-Evaluate)**<br>**CO6-** CO6: To apply the understanding of fluids in identifying the fluids and its different types.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Turbulent flow : Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 2 | Pipe flow problems : Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes. Study of weir and notches (rectangular, triangular, trapezium section) Pipe Network : Water Hammer , transmission of power, Hardy Cross Method. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| 3 | Uniform flow in open channels : Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| 4 | Non uniform flow in open channels : Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic jump in rectangular channels and its basic characteristics, alternate depth in term of Froude's number surges in open channels & channel flow routing, venturi flume. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 5 | Turbines : Pelton turbine-their construction and settings, characteristic curves. Reaction turbines: construction & settings, draft tube theory, cavitation. Pumps: Centrifugal pumps : Various types and their important components, net positive suction head, specific speed, cavitation, principle of working and characteristic curves. Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Impact of Jets | Experiments | BL2-Understand | 4 |
| 2 | To study the characteristics of Hydraulic Jumps | Experiments | BL4-Analyze | 4 |
| 3 | To study the characteritics of Pelton Turbine | Experiments | BL5-Evaluate | 4 |
| 4 | To study the characteristics of Francis Turbine | Experiments | BL3-Apply | 4 |
| 5 | To study the characteristics of Kaplar Turbine | Experiments | BL4-Analyze | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 30 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Hydraulics & Fluid Machines by P N Modi & Seth Hydraulic Machanics - K.R. Arora |
| **Articles** | https://archive.nptel.ac.in/courses/112/103/112103249/ |
| **References Books** | Fluid mechanics and hydraulic machine - Dr. R.K. Bansal |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/103/112103249/ |
| **Videos** | https://books.google.co.in/books/about/Fluid_Mechanics_Hydraulic_Machines.html?id=-EZJzwEACAAJ&source=kp_cover&redir_esc=y |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 2 | 1 | - | 2 | - | - | 2 | - | 1 | 3 | 1 | 2 |
| CO2 | 1 | - | 1 | - | - | 1 | - | 2 | - | 1 | - | 2 | 1 | 3 | - |
| CO3 | - | 1 | 1 | 2 | - | 1 | - | 2 | 1 | 2 | - | 1 | 2 | 3 | 1 |
| CO4 | 1 | 2 | - | - | 2 | 1 | - | 2 | 1 | - | 2 | 1 | - | 1 | 2 |
| CO5 | 1 | - | - | - | 1 | 2 | - | 1 | 2 | - | 2 | 1 | - | 1 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Advanced Surveying |
| **Course Code** | CEL0511[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Students should have the basic knowledge of fundamentals of surveying | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Students will revise the concept of Surveying with its Principles.**(BL1-Remember)**<br>**CO2-** CO2: Students are able to understand the surveying with advance instrument like remote sensing, GPS and GIS, hydrographic survey and Arial Photogrammetry.**(BL2-Understand)**<br>**CO3-** CO3: Students are able to Take the Data concerning different types of Surveying Instruments.**(BL3-Apply)**<br>**CO4-** CO4:To analyze Indeterminate structures and towers according to dynamic loading**(BL4-Analyze)**<br>**CO5-** CO5: Students will be able to Process the GIS and GPS and Hydrographic Data and evaluate the Different Dimensions of Image projections**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Modern equipments for surveying: Digital levels and theodolites, Electronic Distance measurement (EDM), Total Station and Global Positioning Systems (GPS), Digital Planimeter. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 2 | Hydrographic Surveying: various type of survey for hydrographic, sounding, method of observation, equipment for sounding, computations and plotting, discharge measurement, area measurement, rain gauging, marine surveying. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 3 | GPS Surveying: Introduction & components of GPS, Space segment, control segment and user segment, Elements of Satellite based surveys-Map datum, GPS receivers, GPS observation methods and their advantages over conventional methods. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 4 | Photogrammetry: Principle, definitions and classifications of terrestrial and aerial photogrammetry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| 5 | Remote Sensing: Principle, components, classification, remote sensing data acquisition process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellites (IRS) and applications. Geographic Information Systems (GIS): Definition, components and advantages. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study the intersection method of Plane Table Survey | Field work | BL2-Understand | 4 |
| 2 | To study the contouring for different levels | Field work | BL3-Apply | 4 |
| 3 | To study the Resection method by Plane Tabling | Field work | BL4-Analyze | 4 |
| 4 | To determine levels by Reciprocal Levelling | Field work | BL5-Evaluate | 4 |
| 5 | To determine the location by Global Positioning System | Field work | BL6-Create | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 30 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Advance Surveying volume II & III - B.C.Punmia |
| **Articles** | https://khannapublishers.in/index.php?route=product/product&path=60&product_id=142, Advanced-Surveying-Station-Remote-Sensing/dp/8131700674 |
| **References Books** | Advanced Surveying Vol. II - S.K. Duggal |
| **MOOC Courses** | http://acl.digimat.in/nptel/courses/video/105107121/L22.html |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | 1 | 3 | - | 2 |
| CO2 | 1 | - | 1 | 2 | 1 | 3 | - | - | 3 | 3 | - | 2 | 3 | 2 | 2 |
| CO3 | - | 1 | - | 1 | 2 | - | 2 | - | 1 | - | - | - | 3 | 2 | 2 |
| CO4 | 1 | - | 1 | 2 | 2 | - | 2 | - | 1 | - | - | - | 3 | - | 2 |
| CO5 | - | - | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Fundamentals of Structural design(RCC) |
| **Course Code** | CEL0512[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Student should have the basic knowledge of structures & drawing concepts | | | **Co-Requisite/s** | Students have to follow the concept of Structural drawing | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**<br>**CO6-** • CO6: To apply the understanding of different Rcc problems in identifying the quality of Rcc and its different types**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| 2 | Design of Beams: Singly & Doubly reinforced sections. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 3 | Design of Slabs: Slabs spanning in one & two direction, Yield line theory | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 4 | Columns & Footings: Design of column of various cross section, Design of various footings | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| 5 | Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, tread-riser staircase. | Lectures with problem based learning, experimental learning, case study, field trips | 7 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Types of Bars | Field work | BL6-Create | 4 |
| 2 | Types of Column | PBL | BL6-Create | 2 |
| 3 | Beam Design | PBL | BL5-Evaluate | 3 |
| 4 | Staircase | PBL | BL6-Create | 2 |
| 5 | One Way lab | | BL4-Analyze | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 30 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | RCC Designs B.C. Punmia Laxmi Publications. |
| **Articles** | https://books.google.co.in/books/about/Reinforced_Concrete_Structures_Vol_I.html?id=6g1fu4pRDCkC&redir_esc=y |
| **References Books** | Reinforced Concrete Design, New Age Publication House Krishna Raju New Age Publishers |
| **MOOC Courses** | |
| **Videos** | https://archive.nptel.ac.in/courses/105/105/105105105/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 1 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | 1 | - | 1 | - | - | - | - | - | - | 2 | 1 | - | 3 | 2 | 2 |
| CO4 | 1 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | - | 1 | - | 2 | 1 | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Advanced Methods of Structural Analysis |
| **Course Code** | CEL0514[T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | 3 | 1 | 0 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Students should have the basic knowledge in Engg. Mechanics, Strength of Materials, etc | | | **Co-Requisite/s** | Analyzing Reactions | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1:Students will revise the concept of Conventional Methods of analysis of Determinate Structures**(BL2-Understand)**<br>**CO2-** • CO2:To make the student familiar with latest computational techniques used for structural analysis.**(BL4-Analyze)**<br>**CO3-** • CO3:Students are able to apply these methods for analyzing the indeterminate structures to evaluate the response of structures**(BL3-Apply)**<br>**CO4-** • CO4:To analyze Indeterminate structures and towers according to dynamic loading**(BL4-Analyze)**<br>**CO5-** • CO5:Students will be able to determine response of structures by classical, iterative and matrix methods**(BL5-Evaluate)**<br>**CO6-** • CO6:To enable the student get a feeling of how real-life structures behave.**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Moment distribution and slope deflection methods in analysis of frames with sway, analysis of box frame, analysis of beams and frames by Kani's method. | Lectures with problem based learning, case study | 8 |
| 2 | Plastic analysis of beams and frames | Lectures with problem based learning, case study | 10 |
| 3 | Analysis of tall frames, wind and earthquake loads, codal provisions, Approximate analysis of multistory frames for vertical and lateralloads | Lectures with problem based learning, case study | 9 |
| 4 | Matrix method of structural analysis: force method and displacement Method | Lectures with problem based learning, case study | 9 |
| 5 | Influence lines for intermediate structures by using Muller Breslau Principle | Lectures with problem based learning, case study | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Prototype analysis in framed strctures | PBL | BL5-Evaluate | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | Intermediate structural analysis Wang C k McGraw Hill, New York |
| **Articles** | https://archive.nptel.ac.in/courses/105/105/105105166/ |
| **References Books** | Theory of structure Dhanpat rai Publications S. Ramamutham |
| **MOOC Courses** | |
| **Videos** | https://www.youtube.com/watch?v=qhEton-EEOw |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | - | - | - | - |
| CO2 | 2 | - | 1 | 2 | 2 | - | - | - | 2 | - | - | - | - | - | - |
| CO3 | 1 | - | 1 | 2 | - | - | 2 | 1 | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | - | 1 | - | - | 1 | 1 | - | - | - | - | - | - | - |
| CO5 | 1 | - | - | 2 | - | 2 | 2 | - | 2 | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Advanced Geotech Engineering |
| **Course Code** | CEL0515[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Students should have the knowledge of basics of Geo technical Engineering | | | **Co-Requisite/s** | Students will attain general practice of lab testing of soil. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Students will revise the concept of mechanics of soil.**(BL2-Understand)**<br>**CO2-** CO2: Students are able to understand the concept of excavation and different types of foundations.**(BL2-Understand)**<br>**CO3-** CO3: Students are able to apply the knowledge of different foundations for construction practices.**(BL3-Apply)**<br>**CO4-** CO4: To analyze different theories of bearing capacities and settlements regarding structures.**(BL4-Analyze)**<br>**CO5-** CO5: Students will be able to conduct several tests and evaluate different parameters of foundation**(BL6-Create)**<br>**CO6-** CO6: To complete foundation work at a construction site.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Soil Exploration and Foundations on Expansive and Collapsible soils: Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 2 | Shallow Foundations: Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Skempton, Meyerhof and Hansan. I.S. code on B.C. Determination of bearing capacity. Limits of total and differential settlements. Plate load test | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| 3 | Sheet piles/Bulkheads and Machine foundation: Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| 4 | Deep Foundation: Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 5 | Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To determine the consistency of soil by Casagrande'ss Appratus | Experiments | BL4-Analyze | 4 |
| 2 | To determine dry density by Standard Proctor Test | Experiments | BL5-Evaluate | 4 |
| 3 | To determine particle size distribution by sieve analysis method | Experiments | BL2-Understand | 4 |
| 4 | To determine specific gravity by Pycnometer | Experiments | BL4-Analyze | 4 |
| 5 | To apply permeabilty test | Experiments | BL6-Create | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 30 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Soil Mechanics & Foundation Engg. B.C. Punamia Geotech. Engg - C.Venkatramaiah |
| **Articles** | https://www.hzu.edu.in/engineering/Geotechnical_Engineering.pdf |
| **References Books** | Soil Mechanics and Foundation - Dr. K. R. Arora |
| **MOOC Courses** | |
| **Videos** | http://www.digimat.in/nptel/courses/video/105101001/L01.html, https://archive.nptel.ac.in/courses/105/101/105101001/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 1 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | 1 | - | 1 | - | - | - | - | - | - | 2 | 1 | - | 3 | 2 | 2 |
| CO4 | 1 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | - | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Basic of Structural Design (Steel) |
| **Course Code** | CEL0617[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | basics of steel, strentgh of material | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts in theory of steel structures**(BL1-Remember)**<br>**CO2-** To understand & analyze the different steel structures problems.**(BL2-Understand)**<br>**CO3-** To implement the different designing concepts of steel structures**(BL3-Apply)**<br>**CO4-** To provide experimental basis, and to enable the students to analyze the behaviour of various steel structures and its properties.**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of different steel structural members in various fields such as research & industries.**(BL5-Evaluate)**<br>**CO6-** To apply the understanding of steel structure problems in identifying the quality of steel and its different types.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit 1 | Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, design of structural connections- bolted, riveted and welded connections | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unitII | Design of basic structural elements-tension, compression, flexure. Provision of IS 800-2007 | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit III | Design of trusses-angular and tubular | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| unit IV | Design of Simple and Compound Column base grillage foundation | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit V | Introduction to flexural member, Design of beam-simple and built up, Laterally supported and laterally unsupported beam. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | drawing of riveted connection | Experiments | BL2-Understand | 3 |
| II | drawing of bolted conecction | Experiments | BL2-Understand | 2 |
| III | drawing of wellded connection | Experiments | BL4-Analyze | 2 |
| IV | drawing of joints | Experiments | BL2-Understand | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 20 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Steel Structure |
| **Articles** | |
| **References Books** | Steel Structure |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 2 | 1 | - | - | 1 | 1 | 1 | - | 2 | - | - | 3 |
| CO2 | - | 1 | 1 | 1 | 3 | - | - | 1 | - | 1 | - | 2 | - | - | 2 |
| CO3 | 1 | - | 2 | 1 | 2 | 1 | - | 1 | - | 1 | - | 2 | - | 2 | - |
| CO4 | 1 | 1 | 2 | 1 | - | - | - | - | 1 | - | - | - | 1 | - | 2 |
| CO5 | - | - | 1 | - | - | - | 1 | - | - | - | 1 | - | - | 1 | - |
| CO6 | 1 | 3 | - | 2 | - | - | - | 1 | - | - | - | - | - | - | 1 |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Advanced Structural Design (RCC) |
| **Course Code** | CEL0619[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | basic knowledge of mechanics | | | **Co-Requisite/s** | basics of strength of materials | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Torememberthevarious concepts Steel Design.**(BL1-Remember)**<br>**CO2-** Tounderstandthe concept of design of Multi-Storey Buildings.**(BL2-Understand)**<br>**CO3-** To implementthe different designing concepts retaining of earth work with retaining walls.**(BL3-Apply)**<br>**CO4-** Toprovidedifferent types of structural elements as per the requirement of structure**(BL3-Apply)**<br>**CO5-** Todesignthe silos and bunkers**(BL5-Evaluate)**<br>**CO6-** ToCreate different RCC Complex structures with designing**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit 1 | Design of Multistory Buildings - Sway and non sway buildings, Shear walls and other bracing elements | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unitII | Earth Retaining Structures: Cantilever and counter fort types retaining walls | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit III | Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular &intze tanks | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| unit IV | Silos and Bunkers | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit V | T-beam & Slab bridges- for highway loading (IRC Loads). Prestressing concepts materials, systems of prestressing& losses Introduction to working & limit State Design | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | component design of silos | Experiments | BL4-Analyze | 3 |
| II | component design of water tank | Experiments | BL4-Analyze | 2 |
| III | design of bunker | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |

Part E

| | |
|---|---|
| **Books** | R.C.C Vol 2 N krishna raju |
| **Articles** | https://www.academia.edu/40762446/BC_Punmia_SURVEYING_Vol_1_By_EasyEngineering_net_1_ |
| **References Books** | BC Punmia |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_ce65/preview |
| **Videos** | https://www.youtube.com/watch?v=GJHHtS2t140 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | - | - | 1 | - | 2 | - | 1 | 1 | - | - | - |
| CO2 | 1 | 1 | 2 | 3 | 1 | - | 1 | 2 | - | 1 | 1 | 1 | - | 2 | - |
| CO3 | 2 | 3 | 1 | 2 | - | 1 | - | 1 | - | - | 2 | 1 | - | - | 1 |
| CO4 | 1 | 2 | 1 | 1 | 1 | 1 | - | 2 | - | 1 | - | 1 | - | 1 | - |
| CO5 | 2 | - | 1 | - | 1 | 2 | - | - | 1 | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Quantity Surveying & Costing |
| **Course Code** | CEL0621[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | introduction of material | | | **Co-Requisite/s** | basic knowledge of materials | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts in theory of Specification**(BL1-Remember)**<br>**CO2-** To understand & analyze the different Quantity Estimates**(BL4-Analyze)**<br>**CO3-** : To implement the different designing concepts of Quantity Estimation.**(BL5-Evaluate)**<br>**CO4-** To provide experimental basis, and to enable the students to analyze the quantity and cost estimates.**(BL3-Apply)**<br>**CO5-** To evaluate the applications of different Estimation and Costing in various fields such as research & industries.**(BL3-Apply)**<br>**CO6-** : To apply the understanding of Rate Analysis in solving problem of Estimation**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit 1 | Purpose and importance of estimates, principles of estimating methods of taking out Quantities of items of work. Mode of Measurement, Measurement sheet and adstract sheet; bills of quantities | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unitII | Types of estimate, plinth area rate, cubical content rate, preliminary original, revised and supplementary estimates different projects preparing detailed estimates of various types of Building, RCC work earth work calculations for roads and estimating of culverts. Services for building such as water supply, drainage. | Lectures with problem based learning, experimental learning, case study, field trips | 9 |
| unit III | Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates (C.S.R), Specification. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |
| unit IV | Cost works : Factors affecting cost of work, overhead charges Contingencies and work charge establishment, various percentage for different services in building. | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| unit V | Valuation : Purpose, depreciation, sinking fund. scrap value year's purchase, gross and net income, dual rates interest. Method of Valuation, rent fixation of buildings. | Lectures with problem based learning, experimental learning, case study, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | module of bulding | PBL | BL4-Analyze | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | BN Dutta |
| **Articles** | https://www.scribd.com/document/545528438/Estimating-and-Costing-in-Civil-Engineerng-B-N-Dutta-24th-Ed |
| **References Books** | Estimation and Costing in Civil Engineering by S. Dutta |
| **MOOC Courses** | https://www.my-mooc.com/en/mooc/construction-cost-estimating/ |
| **Videos** | https://www.youtube.com/watch?v=aO3Ol3XLHkI |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | 3 | - | 2 | - | 2 | 3 | 3 | 1 | - | - | - | 1 |
| CO2 | - | 2 | 3 | 2 | 3 | - | - | 1 | - | 1 | - | 2 | - | - | 1 |
| CO3 | 2 | - | 1 | 3 | 1 | - | - | 1 | 2 | - | - | 1 | 2 | - | 3 |
| CO4 | 1 | 2 | - | - | 1 | 1 | - | - | 2 | - | - | 3 | - | 1 | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Environmental Engineering |
| **Course Code** | CEL0634[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts in theory of sources of water.**(BL1-Remember)**<br>**CO2-** To understand & analyze the concept of population forecasting**(BL2-Understand)**<br>**CO3-** To provide experimental basis, and to enable the students to analyze physical, chemical and biological impurities**(BL4-Analyze)**<br>**CO4-** To evaluate the applications of rain water harvesting**(BL5-Evaluate)**<br>**CO5-** To apply the understanding of water treatment**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations. | Lectures with Presentation, Site Visit to STP | 8 |
| 2 | Characteristics and analysis of waste wate, rcycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, Th OD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis. | Lectures with Presentation, Seminar and experiments | 8 |
| 3 | Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design. | Lectures with Presentation, Site Visit to STP | 8 |
| 4 | Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal. | Lectures with Presentation, Seminar and experiments | 8 |
| 5 | Advanced Waste Water treatment - Diatomaceorus earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil. | Lectures with Presentation, Seminar and experiments | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Physical examination of Sewage/Water: a. Total Solid b. Total dissolve solid c. Total suspended solid d. pH, color and odor | Experiments | BL4-Analyze | 8 |
| 2 | Chemical estimation of Sewage/Water and soil a. Determination of Chlorides b. Estimation of Chemical oxygen Demand | Experiments | BL4-Analyze | 4 |
| 3 | Microbial examination of Sewage/Water a. Confirmation of coliforms b. Biological oxygen demand | Experiments | BL4-Analyze | 4 |
| 4 | Determination of soil microbial biomass carbon | Experiments | BL4-Analyze | 2 |
| 5 | Examination of different bacteria, algae, fungi, plants and animals by microscopic or morphological examination | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | S.K.Garg, Environmental engineering volume 1 and 2 Khanna publisher B.C.Punamia Environmental engineering volume 1 and 2 Laxmi Publication |
| **Articles** | https://sciendo.com/journal/CEE |
| **References Books** | Viesman, Hammer and Chadik Water supply and pollution control PHI Publication |
| **MOOC Courses** | https://nptel.ac.in/courses/103107084 |
| **Videos** | http://www.digimat.in/nptel/courses/video/105107176/L01.html |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 1 | - | - | 2 | - | - | - | 1 | 2 | 2 | 2 | 1 |
| CO2 | 2 | 2 | 2 | 2 | - | - | 2 | - | - | - | 1 | 3 | 2 | 2 | 2 |
| CO3 | 2 | 2 | 1 | 2 | - | - | 3 | - | - | - | 2 | 2 | 2 | 3 | 3 |
| CO4 | 2 | 3 | 1 | 2 | - | - | 2 | - | - | - | 1 | 2 | 2 | 3 | 2 |
| CO5 | 2 | 2 | 1 | 2 | - | - | 3 | - | - | - | 1 | 3 | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Advanced Structural Design(Steel) |
| **Course Code** | CEL0723[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 4 | 1 | 0 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | must have the knowledge of steel structure and its component design | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Students will revise the concept of Steel Design.**(BL1-Remember)**<br>**CO2-** CO2:Students are able to understand the concept Plate Girders**(BL2-Understand)**<br>**CO3-** CO3:Students are able to apply the knowledge of different types of truss loading**(BL3-Apply)**<br>**CO4-** CO4:To analyze different loadings on Bunkers and Silos**(BL4-Analyze)**<br>**CO5-** CO5: Students will be able to design several complex steel structures**(BL5-Evaluate)**<br>**CO6-** CO6:To complete Design of Water Tank.**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Design of Plate girder bridges. | lecture with experimental learning, interactive workshops, field trips | |
| 2 | Design of truss girder bridges for railways and highway (IRC &IRS holding) | lecture with experimental learning, interactive workshops, field trips | |
| 3 | WATER TANKS: Pressed steel tanks, tanks with ordinary plates for different cross section. | lecture with experimental learning, interactive workshops, field trips | |
| 4 | Design of Chimneys. | lecture with experimental learning, interactive workshops, field trips | |
| 5 | Introduction of HT electric tower, Bunkers and Silos. | lecture with experimental learning, interactive workshops, field trips | |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1` | design of chimney | Experiments | BL2-Understand | 3 |
| 2 | design of water tank | Experiments | BL4-Analyze | 3 |
| 3 | design of plate girder | Experiments | BL4-Analyze | 3 |
| 4 | design of bunker | Experiments | BL4-Analyze | 3 |
| 5 | design of silos | Experiments | BL4-Analyze | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 20 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Advanced steel design of structure By Chandrasekarn S, crc Press. |
| **Articles** | https://www.scribd.com/document/504740284/DR-B-C-Punmia-Steel-Structure |
| **References Books** | Advanced steel design By B C Punamia, Laxmi Publication. |
| **MOOC Courses** | https://www.youtube.com/watch?v=qJV5zdx7NJs |
| **Videos** | https://www.youtube.com/watch?v=qJV5zdx7NJs |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | 2 | 2 | 3 | 3 | 2 |
| CO2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 1 | 3 | 2 | 3 | 3 |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | 2 | 3 | 2 | 3 | - | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Introduction to Construction Planning and Management |
| **Course Code** | CEL0725[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 03 | 01 | 00 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Students must have knowledge of the RCC Structure. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will get knowledge different management techniques for construction. **(BL1-Remember)**<br>**CO2-** To understand the resource of contract management**(BL2-Understand)**<br>**CO3-** Students are able to Take the details of contracts & Tenders.**(BL3-Apply)**<br>**CO4-** To adopt knowledge in construction & project management.**(BL4-Analyze)**<br>**CO5-** To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts**(BL5-Evaluate)**<br>**CO6-** To Complete Determination of Organisational behaviour**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Methods ofconstruction,formworkandcentering.Scheduleofconstruction,joblayout,principlesofconstructionmanagement,modernmanagementtechniqueslikeCPM/PERTwithnetwork analysis | Lectures with problem based learning, experimental learning, case study, field trips | 10 |
| 2 | Factors affecting selection, investmentand operating cost, output of various equipments, brief study of equipmentsrequiredforvariousjobssuchasearthwork,dredging,conveyance,concreting,hoisting,piledriving,compactionandgrouting | Lectures with problem based learning, experimental learning, case study, | 08 |
| 3 | Contractors & Tenders:- DifferenttypesofContracts&Tenders,noticeinvitingtenders,contractdocument,departmentalmethodofconstruction,rate list, security deposit and earnest money, conditions of contract,arbitration,administrativeapproval,technicalsanction. | LLectures with problem based learning, experimental learning, case study, ectures with whiteboard/PPT, Recorded video/interactive videos, labs | 09 |
| 4 | Importance, types ofspecifications, specificationsforvarioustradesofengineeringworks. Variousformsusedinconstructionworks,measurementbook,cashbook,materialsatsiteaccount, imprestedaccount, toolsandplants, varioustypesofrunningbills,securedadvance,finalbill. | Lectures with problem based learning, experimental learning, case study, | 10 |
| 5 | Accommodationofsitestaff, contractor'sstaff,variousorganizationchartsandmanuals,personnelinconstruction,welfarefacilities,labourlawsandhumanrelations,safetyengineering.Problemofequipmentmanagement,assignmentmodel,transportationmodelandwaitinglinemodals. | Lectures with problem based learning, experimental learning, case study, | 09 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | highway module | PBL | BL2-Understand | 4 |
| 2 | bridge module | PBL | | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | L.S. Srinath, Construction Planning & Management, Laxmi Publication<br>L.S. Srinath, Construction Planning & Management, Laxmi Publication |
| **Articles** | https://easyengineering.net/construction-engineering-and-management-by-seetharaman-nw1/ |
| **References Books** | S.Seetharaman, Introduction to Construction Planning & Management, New Age Publication<br>S.Seetharaman, Introduction to Construction Planning & Management, New Age Publication |
| **MOOC Courses** | https://www.youtube.com/playlist?list=PLWnoy5z_3BObBvFtBlowxM05D-q0VAWEs |
| **Videos** | https://archive.nptel.ac.in/courses/105/104/105104161/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | 1 | 2 | 2 | - | 1 | 3 | 3 | 1 | 2 | 3 | 3 | 2 |
| CO2 | - | 2 | 2 | 2 | 2 | - | 2 | 1 | 1 | 1 | 1 | 1 | 2 | - | 2 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 3 | 2 | 2 | 1 | 1 | - | 2 | - | - | 3 |
| CO4 | - | 2 | 3 | 3 | 2 | - | 3 | 2 | - | - | 1 | 2 | 1 | 2 | 2 |
| CO5 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | 1 | - | 2 | 1 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Railway Engineering |
| **Course Code** | CEL0731[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | have the knowledge of basic transportation | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Students will be able to distinguish different components of Railway Track, different Railway Gauges**(BL1-Remember)**<br>**CO2-** Students will be able to Design track Gradients as per given requirements**(BL4-Analyze)**<br>**CO3-** Students will be able to discuss various Types of Track Turnouts**(BL2-Understand)**<br>**CO4-** Students will be able to describe purposes and facilities at Railway Stations**(BL3-Apply)**<br>**CO5-** Students will be able to Explain Interlocking and modern signal system**(BL3-Apply)**<br>**CO6-** Students will be able to Describe Surface Defects on Railway Track and Their Remedial Measures**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Sources of water & their estimation, water quality from ground & surface waters, various types of water demand requirement of water for various uses, Population forecasting methods. | lecture with experimental learning, interactive workshops, field trips | 8 |
| 2 | General impurities of water, characteristics of water, impurities present & their significance, water borne diseases control, Analysis of water physical, chemical, bacteriological water standard for different uses intake structure, water conveyance, conduit for transportation, pumps for water riffing- materials, operation & pumping station | lecture with experimental learning, interactive workshops, field trips | 8 |
| 3 | Purification of water supply, treatment methods, design, screening segmentation, coagulation, filtration, disinfection, aeration softening of water, advancement & technologies used in sedimentation, filtration . Miscellaneous treatment methods. | lecture with experimental learning, interactive workshops, field trips | 8 |
| 4 | Distribution systems- layout hydraulics, pipe fittings, values. Appurtenances in distribution system, analysis of distri system & pips network – Hardy cross method, detection of leakage, maintenance, location & height of distribution reservoir , service reservoir capacity | lecture with experimental learning, interactive workshops, field trips | 8 |
| 5 | Rural water supply scheme-System in water supply, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation. | lecture with experimental learning, interactive workshops, field trips | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | The Student Shall Draw The Dimensional Sketches( Along with Brief Note)of Different gauges(as per IRC) | PBL | BL3-Apply | 3 |
| 2 | The Student Shall Draw The Dimensional Sketches( Along with Brief Note)of different rail sections, sleepers, track fittings, points and crossings | PBL | BL2-Understand | 3 |
| 3 | Students may be asked to collect photographs from internet which is related to field application of various topics | Field work | BL3-Apply | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Railway Engineering by Satish Chandra and M.M. Agrawal Oxford University Press, New Delhi |
| **Articles** | https://www.springerprofessional.de/en/journal-of-modern-transportation/16439126 |
| **References Books** | A Text Book of Railway Engineering by S.C. Saxena and S. P. Arora. Dhanpat Rai & Sons, Delhi |
| **MOOC Courses** | https://nptel.ac.in/courses/105107123 |
| **Videos** | https://www.youtube.com/watch?v=37WMS483T7Y&t=2s https://ia902309.us.archive.org/6/items/eco-8/ECO8.pdf |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | 2 | 2 | 3 | 3 | 1 |
| CO2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 1 | 3 | 2 | 3 | 3 |
| CO3 | 1 | 1 | - | - | - | - | - | - | - | 2 | 3 | 2 | 2 | 1 | 2 |
| CO4 | 1 | 2 | 2 | 3 | 2 | 3 | 1 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 1 |
| CO5 | 1 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 |
| CO6 | 2 | 3 | 2 | 1 | 1 | - | - | - | - | 1 | 2 | 2 | 2 | 2 | 1 |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Design of Hydraulic Structures |
| **Course Code** | CEL0827[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basics of Structural Design and Analysis | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**<br>**CO6-** • CO6: To apply the understanding of different Rcc problems in identifying the quality of Rcc and its different types**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To find the coefficient of ogee weir | Experiments | BL3-Apply | 2 |
| 2 | To study flow characteristics and pressure distribution over ogee weir | Experiments | BL3-Apply | 2 |
| 3 | To study the effect of hydraulic jump for dissipation of energy of a spillway | Experiments | BL4-Analyze | 2 |
| 4 | Study of different energy dissipators and their efficiencies | Experiments | BL5-Evaluate | 2 |
| 5 | To study the flow characteristics through a siphon spillway | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | SK Garg, Irrigation engg and Hydraulic structures, Khanna publications |
| **Articles** | https://www.freebookcentre.net/civil-books-download/Design-Of-Hydraulic-Structures.html |
| **References Books** | SK Sharma, Irrigation engg and Hydraulic structures, Schand |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/105/105105203/ https://www.youtube.com/watch?v=z9wsUWaN-oY |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | - | - | 1 | - | 2 | 2 | 2 | 1 |
| CO2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | - | 2 | 2 | - | 2 |
| CO3 | 3 | - | - | - | - | - | - | - | - | 1 | - | 2 | 2 | 2 | - |
| CO4 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | - | 2 | 2 | 1 | 1 |
| CO5 | 2 | 1 | - | 1 | - | - | - | - | - | 1 | - | 2 | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Retrofitting and rehabilitation of structures |
| **Course Code** | CEL0831[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**<br>**CO6-** • CO6: To apply the understanding of different Rcc problems in identifying the quality of Rcc and its different types**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To Assess the maintenance of Buildings | PBL | BL4-Analyze | 15 |
| 2 | To diagnose the best technique for failiure of different components of concrete masonary structures | PBL | BL3-Apply | 15 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. Repair and protection of concrete structures by Noel P.Mailvaganam, CRC Press,1991. 2. Concrete repair and maintenance Illustrated by Peter.H.Emmons, Galgotia publications Pvt. Ltd., 2001. 3. "Earthquake resistant design of structures" by Pankaj agarwal, Manish shrikande, PHI, 2006. |
| **Articles** | https://www.researchgate.net/publication/344775584_Modern_Techniques_for_the_Restoration_and_Rehabilitation_of_Concrete_Structures |
| **References Books** | 1. Failures and repair of concrete structures by S.Champion, John Wiley and Sons, 1961. 2. Diagnosis and treatment of structures in distress by R.N.Raikar Published by R & D Centre of Structural Designers and Consultants Pvt.Ltd, Mumbai. 3. Handbook on repair and rehabilitation of RCC buildings, CPWD, Government of India. 4. Handbook on seismic retrofit of buildings, A. Chakrabarti et.al., Narosa Publishing House, 2010 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/105/105/105105213/ |
| **Videos** | https://www.youtube.com/watch?v=widz1C17omE&embeds_referring_euri=https%3A%2F%2Farchive.nptel.ac.in%2F&source_ve_path=OTY3MTQ&feature=emb_imp_woyt |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 2 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | - | - | 2 | 1 | 1 | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Programming Logics |
| **Course Code** | CSP0201[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 4 | 4 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Windows/Linux operating system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Life Insurance Premium Calculator | Experiments | BL3-Apply | 10 |
| 2-3 | Program to compare best life insurance plan using an array. | PBL | BL4-Analyze | 10 |
| 4-5 | Write a C program to read name and marks of n number of students from user and store them in a file. If the file previously exits, add the information of n students. | PBL | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 40 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 60 | 18 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | B. W. Kernighan, Dennis M. Ritchi; The C Programming Language; Prentice Hall. |
| **Articles** | |
| **References Books** | Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | - | 3 |
| CO3 | 2 | - | 1 | - | - | 2 | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | OOPM |
| **Course Code** | CSP0401[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| unit 1-2 | Practical Assignment | Experiments | BL2-Understand | 7 |
| 1-5 | Activity Based Learning | Experiments | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 100 | 60 | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Basic Electronics |
| **Course Code** | ECL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of modern physics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to Laboratory Equipment's: Cathode Ray Oscilloscope (CRO), Function Generator, Digital Multimeter. | Experiments | BL2-Understand | 2 |
| 3 | To study Full Wave Centre Tap Rectifier and calculate various parameters. | Experiments | BL4-Analyze | 2 |
| 1 | To study and plot the V-I characteristics of PN Junction Diode. | Experiments | BL4-Analyze | 2 |
| 4 | To study Full Wave Bridge Rectifier and calculate various parameters | Experiments | BL4-Analyze | 2 |
| 3 | To study and plot Input & Output Characteristics of BJT in Common Base Configuration | Experiments | BL5-Evaluate | 2 |
| 4 | To study and plot Input & Output Characteristics of BJT in Common Emitter Configuration | Experiments | BL4-Analyze | 2 |
| 2 | To Design Half-Wave rectifier by using basic electronic components | PBL | BL6-Create | 10 |
| 4 | To Design subtractor using OPAM | PBL | BL6-Create | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | Boylestad & Nashelsky Electronics Devices and Circuit Theory Pearson Education India, 2009.<br>Ramakant A. Gayakwad Op Amps and Linear Integrated Circuits Englewood Cliffs: Prentice-Hall, 2012. |
| **Articles** | Popović, Božidar, et al. "Remote control of laboratory equipment for basic electronics courses: A LabVIEW-based implementation." Computer Applications in Engineering Education 21.S1 (2013): E110-E120. |
| **References Books** | Malvino, L. Electronic principles The McGraw Hill Companies, 2016.<br>Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press 2017<br>Graham Bell Electronic Devices and Circuits Prentice-Hall 2009 |
| **MOOC Courses** | https://nptel.ac.in/courses/122106025 |
| **Videos** | https://nptel.ac.in/courses/122106025 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | 1 |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | - | 2 | 2 | 2 |
| CO3 | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO5 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Principles of Electrical Engineering |
| **Course Code** | EEL0201[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition |
| **Articles** | |
| **References Books** | 1. Basic Electrical Engg, Sunil S Gaikwad, Dream Tech/ Willey Publication. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 1 | 2 | 1 | 1 | 3 | - | 1 | - | - | 1 | - | 2 | 3 | 1 |
| CO3 | 2 | 1 | 2 | 1 | 2 | - | 2 | - | 2 | 2 | - | - | 1 | 2 | 2 |
| CO4 | 1 | 3 | 1 | 2 | 3 | - | - | - | - | - | - | - | 3 | 1 | 3 |
| CO5 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO6 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | - | 3 | 1 | 3 | 2 |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Communication Skills & Colloquim |
| **Course Code** | HUL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | The course is designed to enable students to enhance ability to comprehend of spoken and written English (and use English) required for effective communication in their professional work | | | **Co-Requisite/s** | Communication skills and emotional intelligence etc. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✓<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG10(Reduced inequalities) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi |
| **Articles** | www.helpguide.org/articles/relationships-communication/effective-communication.htm |
| **References Books** | Rizvi, M.A. Academic Writing: A course in English for Science and Technology, Nabodaya Prakashak , Calcutta |
| **MOOC Courses** | https://nptel.ac.in/courses/109103020 |
| **Videos** | https://nptel.ac.in/courses/109103020 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 2 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | 2 | - | - | 3 | 2 | 3 |
| CO4 | 3 | 2 | - | 2 | 1 | - | - | - | - | 2 | - | - | 2 | 3 | 3 |
| CO5 | 3 | 2 | - | 2 | 1 | - | - | - | - | 2 | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Calculus For Engineers |
| **Course Code** | MAL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 5 | 3 | 2 | 10 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Functions, Limit, Continuity and Differentiability | | | **Co-Requisite/s** | Basic knowledge of variables | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**<br>**CO6-** • CO6: To apply the understanding of different Rcc problems in identifying the quality of Rcc and its different types**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to MATLAB through matrices, and general Syntaxes. | Experiments | BL3-Apply | 2 |
| 2 | Plotting and visualizing curves and surfaces in MATLAB– Symbolic computations using MATLAB | Experiments | BL3-Apply | 2 |
| 3 | Evaluating Extremum of a single variable function | Experiments | BL3-Apply | 2 |
| 4 | Understanding integration as Area under the curve | Experiments | BL3-Apply | 2 |
| 5 | Evaluation of Volume by Integrals (Solids of Revolution ) | Experiments | BL3-Apply | 2 |
| 6 | Evaluating Maxima and minima of functions of several variables | Experiments | BL3-Apply | 2 |
| 7 | Evaluating triple integrals | Experiments | BL3-Apply | 2 |
| 8 | Evaluating gradient, curl and divergence | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | 1. Thomas' Calculus by George B. Thomas, D. Weirand J. Hass, 13th edition 2014, Pearson. 2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 3. B.V. Ramana, Higher Engineering Mathematics, Tata Mc Graw Hill. |
| **Articles** | |
| **References Books** | 1. E. Kreyszig, Advanced Engineering Mathematics, 8th Ed., John Wiley and Sons, 1999. 2. Gorakhprasad, Integral Calculus, Pothishala Publication. 3. Gorakhprasad, Differential Calculus, Pothishala Publication. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ee09/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ph02/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 3 |
| CO2 | 2 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 3 |
| CO3 | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | 3 |
| CO4 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 |
| CO5 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-CivilEngineering

| | |
|---|---|
| **Title of the Course** | Statistics For Engineers |
| **Course Code** | MAL0203[T] |

Part A

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | statistics for engineers typically include basic mathematics (algebra, calculus), understanding of probability theory, and familiarity with concepts in engineering disciplines. Additionally, knowledge of software tools like MATLAB or Python for data analysis is beneficial. | | | **Co-Requisite/s** | statistics for engineers may include introductory courses in engineering mechanics, computer programming, and experimental methods. Additionally, concurrent enrollment in courses covering linear algebra and differential equations could provide valuable mathematical background for understanding advanced statistical concepts and applications in engineering contexts. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction: Understanding Data types; importing/exporting data. | Experiments | BL2-Understand | 2 |
| 2 | Computing Summary Statistics/plotting and visualizing data using Tabulation and Graphical Representations. | Experiments | BL3-Apply | 2 |
| 3 | Applying correlation and simple linear regression model to real dataset; Computing and interpreting the coefficient of determination | Experiments | BL3-Apply | 2 |
| 4 | Applying multiple linear regression model to real data set; computing and interpreting the multiple coefficient of determination | Experiments | BL3-Apply | 2 |
| 5 | Fitting the following probability distributions: Binomial distribution, | Experiments | BL3-Apply | 2 |
| 6 | Normal distribution Poisson distribution | Experiments | BL3-Apply | 2 |
| 7 | Testing of hypothesis for One sample mean and proportion from real, time problems | Experiments | BL3-Apply | 2 |
| 8 | Testing of hypothesis for Two sample mean and proportion from real, time problems | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | M. Ray, H.S. Sharma, Sanjay Chaudhary Mathematical Statistics Ram Prasad & Sons<br>J.N. Sharma, J.K. Goyal Mathematical Statistics Krishna Prakash and Media (P) Ltd |
| **Articles** | |
| **References Books** | E.Kreyszig Advanced Engineering Mathematics 8 th Ed., John Wiley and Sons, 1999<br>B.V. Ramana Higher Engineering Mathematics Tata McGraw Hill<br>B. S. Grewal Higher Engineering Mathematics Khanna Publishers |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ec03/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ec03/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | 1 | - | - | - | - | 1 | - | 1 |
| CO2 | 3 | 3 | 1 | 3 | 3 | 2 | - | 1 | - | 1 | - | - | 2 | - | 2 |
| CO3 | 3 | 2 | - | 1 | 3 | - | - | - | - | - | - | - | 1 | 3 | 2 |
| CO4 | 3 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | 3 | 1 |
| CO5 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 2 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Engineering Mathematics |
| **Course Code** | MAL0308[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of equations | | | **Co-Requisite/s** | Basic knowledge of roots | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | 1. B.V.Ramana, Higher Engineering Mathematics, Tata McGraw Hill 2. B.S.Grewal, Higher Engineering Mathematics ,Khanna Publishers 3. H.K.Das and R. Verma, Higher Engineering Mathematics, S.Chand and Company Pvt.Ltd. |
| **Articles** | |
| **References Books** | 1. E.Kreyszig, Advanced Engineering Mathematics ,John Wiley and Sons, 1999 2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers. 3. T. Veerajan and T. Ramachandran, Theory and Problems in Numerical Methods, Tata McGraw Hill |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ma36/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ma36/preview |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | - | - | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | - | - | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Engineering Mechanics |
| **Course Code** | MEL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | 1. To verify the law of Triangle of forces and Lami's theorem. | Experiments | BL3-Apply | 2 |
| Experiment-2 | 2. To verify the law of parallelogram of forces | Experiments | BL3-Apply | 2 |
| Experiment-3 | 3. To verify law of polygon of forces | Experiments | BL3-Apply | 2 |
| Experiment-4 | 4. To find the support reactions of a given truss and verify analytically. | Experiments | BL3-Apply | 2 |
| Experiment-5 | 5. To determine support reaction and shear force at a given section of a simply supported beam and verify in analytically using parallel beam apparatus. | Experiments | BL3-Apply | 2 |
| Experiment-6 | 6. To verify bending moment at a given section of a simply supported beam. | Experiments | BL3-Apply | 2 |
| Experiment-7 | 7. To find coefficient of friction on horizontal and inclined planes. | Experiments | BL3-Apply | 2 |
| Experiment-8 | 8. To determine centre of gravity of different shapes. | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Engineering Mechanics by Dr. D.S. Kumar, S.K. Kataria & sons, latest edition. Engineering Mechanics by R. K. Rajput, S.Chand & Co. Engineering Mechanics: Statics & Dynamics by R.C. Hibbler |
| **Articles** | |
| **References Books** | • Engineering Mechanics- statics dynamics by Boresi & Schmidt, Thomson Books • Engineering Mechanics - Schaum's series - Mc.Grawhill Publications. • Engineering Mechanics by S. Timashenko, D.H. Young and J.V. Rao |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106286/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | - | 1 | 3 | - | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | - | 1 | 2 | 1 | 1 | 1 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Engineering Graphics |
| **Course Code** | MEL0202[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of geometrical construction, sketching, imagination etc. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Drawing sheet of plane scale. | Experiments | BL3-Apply | 2 |
| Experiment -2 | Drawing sheet of diagonal scale. | PBL | BL3-Apply | 2 |
| Experiment -3 | Drawing sheet of ellipse. | PBL | BL3-Apply | 2 |
| Experiment -4 | Drawing sheet parabola and hyperbola | | BL3-Apply | 2 |
| Experiment -5 | Drawing sheet of cycloidal curves. | | BL3-Apply | 2 |
| Experiment -6 | Drawing sheet of orthographic projection | | BL3-Apply | 2 |
| Experiment -7 | Drawing sheet of projection of line | | BL3-Apply | 2 |
| Experiment -8 | Drawing sheet of projection of plane. | | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. N.D.Bhatt Elementary of Enginnering Drawing Charotar Publication<br>P.S. Gill Engineering Drawing Kataria Publication<br>Agrawal and Agrawal Engineering Drawing TMH |
| **Articles** | |
| **References Books** | Venu Gopal K Engineering Drawing New age<br>K.L. Narayana& P. Kannaiah Engineering Drawing SCITECH Pub. |
| **MOOC Courses** | https://nptel.ac.in/courses/112103019 |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 2 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | - | - | 2 | 1 | 1 | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-CivilEngineering**

| | |
|---|---|
| **Title of the Course** | Mechanical Workshop Practice |
| **Course Code** | MEP0101[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of casting, joining and machining. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • CO1: To remember the various concepts in theory of Rcc structures**(BL1-Remember)**<br>**CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)**<br>**CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)**<br>**CO4-** • CO4: To provide experimental basis, and to enable the students to analyze the behaviour of various Rcc structures and its Functional properties**(BL2-Understand)**<br>**CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | To study of Tools and Their Operations in Carpentry joint | Experiments | BL2-Understand | 4 |
| Experiment-2 | To Prepare Half Lap corner joint and T- joint | Experiments | BL3-Apply | 4 |
| Experiment-3 | To study of tools and their operations in Fitting Shop | Experiments | BL3-Apply | 4 |
| Experiment-4 | To study of tool and operations in welding shop | Experiments | BL3-Apply | 4 |
| Experiment-5 | To study of single point cutting tools , machine tool and operations in machine shop | Experiments | BL3-Apply | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | 0 | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. S. K. Hazra Chowdhry Elements of Workshop Technology Vol-1 Tata Mc Graw Hill Publication 2 John K.C Mechanical Workshop Practice Paperback – 1 Khanna Publishers, 2001 |
| **Articles** | |
| **References Books** | 1. English, Paperback, Dave A K, Dubey D Workshop Technology & Practice Standard Publishers, 2010 2. W.A.J. Chapman Workshop Technology by vol. 1,2 Mc Graw Hill, 2001 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/103/112103108/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | - | - | 2 | 2 | 1 | - | - | 2 | 2 | 2 | 1 | - | - |
| CO2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | - | - | - | 2 | 2 | 3 | 3 |
| CO3 | 2 | 1 | 2 | - | - | - | 2 | 2 | - | - | - | 2 | 3 | - | 3 |
| CO4 | 1 | 2 | 2 | - | - | 2 | 1 | - | - | 2 | 2 | 3 | 3 | 2 | 2 |
| CO5 | - | 2 | 1 | 2 | 2 | 2 | 3 | 2 | - | - | - | 2 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Essentials of Information Technology |
| **Course Code** | CSL0201[T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | 2 | 0 | 2 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Basics of Computer system, Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the basics of Computer systems like types, I/O devices, storage of computer systems (Knowledge, Understand)**(BL1-Remember)**<br>**CO2-** Apply the various networking concepts, topologies and remove deadlocks. (Apply).**(BL2-Understand)**<br>**CO3-** Explain various memory management techniques and Analyze the concept of Sub-programs and blocks (Analysis)**(BL3-Apply)**<br>**CO4-** Design the concept of software, operating system for better utilization of external system (Design)**(BL4-Analyze)**<br>**CO5-** Evaluating the various algorithm, its solution and other communication techniques. (Investigation).**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Computer Basics: Basics of Computer Systems(T1,T2), Evolution of Computers, Computer Generations, Classification of Computers(T1,T3), Computer Applications, Interaction between User and Computer(T7). Hardware Components, Basic Computer Organization, Input and Output Devices(T1,T3), Central Processing Unit(T1), System Bus Architecture, Memory or Storage Unit | White Board, PPT | 6 |
| 2 | Operating System: Introduction to Operating System, Function of Operating Systems(T1), Working Knowledge of GUI-Based Operating System (T3,T4), Working with latest version of Windows(T3,T4). Various Operating Systems, Evaluation of Operating System(T3,T4,T,7), Virtual Machine, Operating Systems for Mobile, Installation of Operating System(T1,T3,T4), Boot Process. | White Board, PPT | 6 |
| 3 | Computer Networks and World Wide Web: Introduction to Computer Networks (LAN, MAN, WAN, PAN)(T3,T4), Network Topologies, Ethical Issues related to Network Security(T2,T3). Internet and World Wide Web(T7,T8), Internet Evolution(T1), FTP, Electronic Mail, Search Engines(T1), Introduction to HTML, Static and Dynamic Web Pages | White Board, PPT | 6 |
| 4 | Computer Software: Introduction, System Software(T1,T3), Application Software, Firmware(T3), Software Installing and Uninstalling(T3,T4), Software Development Steps, Characteristics of good software(T1,T7), Usability of software, Introduction to Free and Open Source Software(T3,T4), Introduction to Database Management System | White Board, PPT | 6 |
| 5 | Subprograms and Blocks: Problem Solving: Flow Charts(T3,T4), Tracing Flow Chart, Algorithms. Fundamentals of sub-programs(T1,T3,T4), Scope of life time of variables, static and dynamic scope(T7), design issues of subprograms and operations, parameter passing methods(T3,T4), overloaded sub-programs, generic sub-programs(T1,T3), design issues for functions user defined overloaded operators | White Board, PPT | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Explain the Installation process of Operating system and its Memory Management. | Experiments | BL2-Understand | 10 |
| 2-3 | Design of a Web Page which describe your Biodata. | PBL | BL3-Apply | 10 |
| 4-5 | Describe Software development life cycle (SDLC) with all components. | PBL | BL5-Evaluate | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | P. K. Sinha, Priti Sinha; Computer Fundamentals; BPB Publication. V. Rajaraman; Fundamentals of Computers; Prentice Hall of India Publication. G. G. Wilkinson; Fundamentals of Information Technology; Wiley-Blackwell Publishing. Yashwant P. Kanetkar; Let Us C; BPB Publication. |
| **Articles** | |
| **References Books** | E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. Ron Mansfield; Working in MS-Office; Tata McGraw Hill Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | - | - | 1 | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | - | - | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Data Structure and Application |
| **Course Code** | CSL0457[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic Data structure and C Programming | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax of C programming **(BL1-Remember)**<br>**CO2-** To understand the Basic concept of Data structure, application areas and tools for data science **(BL2-Understand)**<br>**CO3-** Applying coding for handling logic data and algorithm for handling data from data files **(BL3-Apply)**<br>**CO4-** Analyzing the hash function concepts of collision and its resolution methods **(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the data structure using statistical & visualization tools**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Linear Array, Operations on Linear Array, Multidimensional Array, Sparse Matrices Strings; Linked List: Operations on Linked List, Garbage Collection, Header Linked List, Two-Way Linked List, Circular Linked List | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Stacks: Implementation of Stacks using Arrays and Linked Lists, Polish Notations, Conversion from Infix to Postfix, Evaluation of Postfix Expressions Queues: Representation of Queues, Implementation of Queues using Arrays and Linked Lists, Circular Queue, De-Queue, Priority Queues, Recursion | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Trees: Definition, Terminology; Binary Trees: Representation in Memory, Traversing Binary Tree, Extended Binary Tree, Threaded Binary Trees, Operations on Binary Trees; Search Trees: Operations on Search Trees. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Graphs: Terminology, Representation of Graphs, Directed Graphs, Directed Acyclic Graph, Shortest Path Algorithms Graph Traversal; Minimum Cost Spanning Tree: Kruskal's Algorithm, Prim's Algorithm. | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | File Structures, Random Access Files, Indexed Sequential Files, Hash Tables, Hashing Functions, B Trees and B+ Trees; Sorting: Bubble Sort, Heap Sort, Quick Sort; Searching: Linear Search, Binary Search | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | implement array and traverse all the elements of the array | Experiments | BL4-Analyze | 2 |
| 3 | Write a program in C to delete an element from the array with given item of information | Experiments | BL4-Analyze | 2 |
| 4 | Write a program in C to implement the bubble sort algorithm. | Experiments | BL4-Analyze | 2 |
| 5 | Write a program in C to implement the linear search algorithm. | Experiments | BL4-Analyze | 2 |
| 6 | Write a program in C to implement the binary search algorithm | Experiments | BL4-Analyze | 2 |
| 7 | Write a program in C to create and traverse the elements of the two- dimensional array. | Experiments | BL4-Analyze | 2 |
| 8 | Write a program in C to create and traverse the elements of the multidimensional array. | Experiments | BL4-Analyze | 2 |
| 9 | create and display the element of the linked list | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) Gilberg and Forouzan: "Data Structure- A Pseudo code approach with C" by Thomson publication |
| **Articles** | https://arxiv.org/ftp/arxiv/papers/1602/1602.07799.pdf |
| **References Books** | 1) Fundamentals of data structure in C" Horowitz, Sahani & Freed, Computer Science Press. |
| **MOOC Courses** | https://www.udemy.com/course/master-the-coding-interview-data-structures-algorithms/?utm_source=adwords&utm_medium=udemyads&utm_campaign=DataStructures_v.PROF_la.EN_cc.INDIA&campaigntype=Search&portfolio=India&language=EN&product=Course&test=&audience=Keyword&topic=&priority=&utm_content=deal4584&utm_term=_._ag_113517925170_._ad_670113708132_._kw_best+dsa+course_8708654526 13_._lI_1007796_._pd_._&matchtype=b&gad_source=1&gclid=CjwKCAjwrvyxBhABEiwAEg_KgvtbvKoF-XCo7SBAvYky8ApNQqBQ3kaPlEK40Ltv69vBshX8AoP5kRoCK0QAvD_BwE&couponCode=LETSLEARNNOWPP |
| **Videos** | https://nptel.ac.in/courses/106102064 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 1 | 2 | - | - | - | 3 | - | - | - | - | 1 |
| CO2 | 1 | 3 | 1 | - | 1 | 2 | - | - | - | 3 | - | - | - | - | 3 |
| CO3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO4 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO5 | 2 | 3 | - | 1 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Programming Logics |
| **Course Code** | CSP0201[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Windows/Linux operating system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember: Recall the syntax and basic concepts of C programming. **(BL1-Remember)**<br>**CO2-** Understand: Explain the meaning of C programming constructs and how they work together**(BL2-Understand)**<br>**CO3-** Apply : Apply the various conditional and looping statement and functional programming.**(BL3-Apply)**<br>**CO4-** Analyzing: Analyze and evaluate C programming code to identify errors and optimize performance.**(BL4-Analyze)**<br>**CO5-** Evaluate : Evaluate the effectiveness of C programming solutions and propose improvements.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Character set, variables and identifiers, built-in data types, arithmetic operators and expressions, constants and literals, simple assignment statements, basic input/output statements, simple 'C' programs. | Demonstration throughPPT, Computer | 10 |
| 2 | Conditional Statements and Loops: Decision making within a program, conditions, relational operators, logical connectives, if statement, if-else statement; Loops: while loop, do-while loop, for loop; nested loops, infinite loops; switch statement, structured programming. Array: One Dimensional Arrays - array manipulation, searching, insertion and deletion in an array; Two Dimensional Arrays - addition/multiplication of two matrices, transpose of a square matrix; string | Demonstration throughPPT, Computer | 10 |
| 3 | Pointer: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays, dynamic memory allocation. Functions: Standard library functions, prototype of a function, return type, function calling, block structure, passing arguments to a function - call by reference and call by value; recursive functions, arrays as function arguments. | Demonstration throughPPT, Computer | 10 |
| 4 | Structure and Union: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays - arrays of structure, structures containing arrays, unions. Dynamic Memory Management: Use of malloc, calloc, realloc and free keywords | Demonstration throughPPT, Computer | 10 |
| 5 | File Management: Introduction, defining and opening a file, closing a file, input/output operations on files, error handling during i/o operations, random access to files, programs using files. Command Line Arguments: argv and argc arguments, programs using command line arguments. Preprocessor: Introduction, macro substitution, file inclusion, compiler control directives. | Demonstration throughPPT, Computer | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Life Insurance Premium Calculator | Experiments | BL3-Apply | 10 |
| 2-3 | Program to compare best life insurance plan using an array. | PBL | BL4-Analyze | 10 |
| 4-5 | Write a C program to read name and marks of n number of students from user and store them in a file. If the file previously exits, add the information of n students. | PBL | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | B. W. Kernighan, Dennis M. Ritchi; The C Programming Language; Prentice Hall. |
| **Articles** | |
| **References Books** | Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. |
| **MOOC Courses** | https://www.my-mooc.com/ja/mooc/logic-and-computational-thinking/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | - | 3 |
| CO3 | 2 | - | 1 | - | - | 2 | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Object Oriented Programming with Java |
| **Course Code** | CSP0303[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 4 | 4 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic principles of the object-oriented programming **(BL1-Remember)**<br>**CO2-** Understand the basic concept of the object-oriented programming **(BL2-Understand)**<br>**CO3-** Apply the logic of oops in java **(BL3-Apply)**<br>**CO4-** Able to Analyze inheritance and abstraction **(BL4-Analyze)**<br>**CO5-** Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Objects and Classes: Introduction of Eclipse software ,Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Inheritance: Inheritance in java, Super and sub class, Overriding, Object class,. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Abstract class, Interface in java, Package in java, UTIL package., encapsulated | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Program to define a structure of a basic JAVA program | Experiments | BL4-Analyze | 2 |
| 2 | Program to define student class with user input | Experiments | BL4-Analyze | 2 |
| 3 | Program to define student class without user input | Experiments | BL4-Analyze | 2 |
| 4 | Program to define class and constructors | Experiments | BL4-Analyze | 2 |
| 5 | Program to define class, methods and objects. Demonstrate method overloading. | Experiments | BL4-Analyze | 2 |
| 6 | Program to define inheritance and show method overriding. | Experiments | BL4-Analyze | 2 |
| 7 | Program to define inheritance with .superclass | Experiments | BL4-Analyze | 2 |
| 8 | Program to define abstraction | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) Daniel Liang, Seventh Edition, Pearson, introduction to Java Programming(Comprehensive Version) Seventh Edition, Pearson. |
| **Articles** | https://www.irjet.net/archives/V7/i10/IRJET-V7I10247.pdf |
| **References Books** | 1) Sachin Malhotra & Saurabh Chaudhary, Programming in Java Oxford University Press. |
| **MOOC Courses** | https://www.coursera.org/courses?query=object%20oriented%20programming |
| **Videos** | https://archive.nptel.ac.in/courses/106/105/106105153/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | 1 | - | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO4 | 2 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 1 | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Computer Programming Lab (PYTHON) |
| **Course Code** | CSP0405[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember the syntax and semantics of Python Programming Language**(BL1-Remember)**<br>**CO2-** Understand the Basic concept of Python Programming **(BL2-Understand)**<br>**CO3-** Apply the concept of Python in ML **(BL3-Apply)**<br>**CO4-** Analysis the use of built-in functions to navigate the file system**(BL4-Analyze)**<br>**CO5-** Implement and evaluate the Python code in project **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | SDG1(No poverty)<br>SDG2(Zero hunger) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Python Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Python IDE, Introduction to anaconda, python variable declaration, Keywords, Indents in Python, Python input/output operations | Lectures with whiteboard/PPT/ Recorded video | 10 |
| 2 | Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence. | Lectures with whiteboard/PPT, Recorded video/Group discussion | 8 |
| 3 | Conditional Statements (If, If-else, If-elif-else, Nested-if etc.) and loop control statements (for, while, Nested loops, Break, Continue, Pass statements | Lectures with whiteboard/PPT/ Recorded video | 8 |
| 4 | Introduction to functions, Function definition and calling, Function parameters, Default argument function, Variable argument function, in built functions in python, Scope of variable in python | Lectures with whiteboard/PPT/Recorded video | 10 |
| 5 | Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file, some important File handling functions e.g open(), close(), read(), readline() etc. Modules Concept of modularization, Importance of modules in python, Importing modules, Built in modules ( ex: Numpy) | Lectures with whiteboard/PPT/ Recorded video | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Write a program to add two numbers in python | Experiments | BL4-Analyze | 2 |
| 1 | Write a Program by using if statement in python | Experiments | BL4-Analyze | 2 |
| 2 | Write a Program by using while loop in python | Experiments | BL4-Analyze | 2 |
| 2 | Write a Program by using for loop in python | Experiments | BL4-Analyze | 2 |
| 3 | Write a program to find whether a number is even or odd | Experiments | BL4-Analyze | 2 |
| 3 | Write a program to find LCM of a number in python | Experiments | BL4-Analyze | 2 |
| 4 | PBL based on face recognition using opencv | PBL | BL4-Analyze | 30 |
| 4 | Write a Program for a simple calculator | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) Let us Python, Yashavant Kanetkar and Aditya Kanetkar, First Edition, 2019, BPB Publications<br>2) OpenGL Programming Guide / Redbook, John Kessenich, Graham Sellers, and Dave Shreiner, Ninth Edition, 2016, Addison-Wesley Professiona |
| **Articles** | https://ieeexplore.ieee.org/document/6057428 |
| **References Books** | 1) Fundamentals of Python Programming, Dr.Abhinav ,Dr. S. Bhargavi<br>2)Learn Python 3 the Hard Way, Zed A. Shaw, First Edition, 2018, Pearson Education Inc |
| **MOOC Courses** | https://onlinecourses.swayam2.ac.in/cec22_cs20/preview |
| **Videos** | https://onlinecourses.swayam2.ac.in/cec22_cs20/preview |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Evaluation of Industrial Training-I |
| **Course Code** | ECD0301[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Internships | | | | | | | |
| **Pre-Requisite/s** | Basic theoretical knowledge of electronics and communication. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business) **(BL1-Remember)**<br>**CO2-** Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website) **(BL2-Understand)**<br>**CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design).**(BL3-Apply)**<br>**CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)**<br>**CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Learning of how to do team work, collaboration with others and learning of insight regarding the internal working atmosphere of companies. | Internships | BL2-Understand | 15 |
| 2 | Learning of how to use the theoretical knowledge for solving the industry problem. | Internships | BL3-Apply | 15 |
| 3 | Development of communication skill, managerial skill and exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. | Internships | BL4-Analyze | 15 |
| 4 | Adapting to evolving business cultures, new methods and technologies, services, technical interface. | Internships | BL4-Analyze | 15 |
| 5 | Learning of how to make industrial training reports and presentation of the reports. | Internships | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | - | - | - | - | 2 | - | - | - | - | 3 |
| CO2 | 1 | 2 | 1 | 2 | 1 | - | - | - | - | 2 | - | - | - | - | 3 |
| CO3 | 1 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 |
| CO4 | 1 | 2 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | - |
| CO5 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Evaluation of Industrial Training-II |
| **Course Code** | ECD0502[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Internships | | | | | | | |
| **Pre-Requisite/s** | Basic theoretical knowledge of electronics and communication. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business) **(BL1-Remember)**<br>**CO2-** Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website) **(BL2-Understand)**<br>**CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL3-Apply)**<br>**CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)**<br>**CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Learning of how to do team work, collaboration with others and learning of insight regarding the internal working atmosphere of companies. | Internships | BL2-Understand | 15 |
| 2 | Learning of how to use the theoretical knowledge for solving the industry problem. | Internships | BL3-Apply | 15 |
| 3 | Development of communication skill, managerial skill and exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. | Internships | BL4-Analyze | 15 |
| 4 | Adapting to evolving business cultures, new methods and technologies, services, technical interface. | Internships | BL4-Analyze | 15 |
| 5 | Learning of how to make industrial training reports and presentation of the reports and training. | Internships | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | - | - | - | - | 2 | - | - | - | - | 2 |
| CO2 | 1 | 2 | 1 | 2 | - | - | - | - | - | 2 | - | - | - | - | 3 |
| CO3 | 1 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO4 | 1 | 2 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 |
| CO5 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Mini Project |
| **Course Code** | ECD0603[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Field Projects | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Electronics and Communication | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To increase writing skills and knowledge**(BL2-Understand)**<br>**CO2-** To enhance their mental ability**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thought**(BL3-Apply)**<br>**CO4-** To have Dissertation works as skills development in student**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Communication, Networks Physical Structures; Different Topologies, Categories of Networks: LAN, MAN, WAN, Interconnection of Networks, The internet Protocols and Standards, Standards Organizations, Network Models, Layered Tasks, The OSI Model, Different Layers in OSI Model. TCP / IP protocol suite | lecture method/Group Discussion | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Identification of a problem and formulation of a topic of project/Thesis | PBL | BL2-Understand | 20 |
| 2 | T0 have field work and data collection through a chosen methodology | PBL | BL5-Evaluate | 20 |
| 3 | Dissertation and VIVA-VOCI | PBL | BL6-Create | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 1 | - | - | - | - | 3 | - | - | - | - | 2 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 3 | - | - | - | 3 | - | - | - | - | 3 |
| CO3 | 1 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 3 |
| CO4 | 1 | 3 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO5 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Major Project-I |
| **Course Code** | ECD0704[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 8 | 8 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To increase writing skills and knowledge**(BL1-Remember)**<br>**CO2-** To enhance their mental ability**(BL2-Understand)**<br>**CO3-** To inculcate the ability to express innovative opinion and thought**(BL3-Apply)**<br>**CO4-** To have Dissertation works as skills development in student **(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-1 | Identification of a problem and formulation of a topic of project/Thesis | PBL | BL2-Understand | 15 |
| Module-2 | T0 have field work and data collection through a chosen methodology | PBL | BL3-Apply | 15 |
| Module-3 | Dissertation and VIVA-VOCI | PBL | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | https://www.ietlucknow.ac.in/sites/default/files/mag/Projects%20of%20Electronics%20and%20communication%20deptt._1.pdf |
| **References Books** | |
| **MOOC Courses** | https://www.coursera.org/learn/major-engineering-project-performance |
| **Videos** | https://nptel.ac.in/courses/110104073 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | - | 1 | - | - | 1 | 2 | 3 | - | - | - | 3 | 1 | - |
| CO2 | - | 3 | 2 | 3 | - | 3 | 1 | - | 3 | 3 | - | 2 | - | 2 | 2 |
| CO3 | - | - | 3 | 3 | 3 | - | - | 3 | 3 | 3 | 1 | 2 | - | 3 | 2 |
| CO4 | - | - | - | - | - | - | 3 | 3 | 3 | 3 | 2 | 3 | - | 3 | 3 |
| CO5 | - | - | - | - | - | - | - | - | 3 | 3 | - | 3 | - | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Major Project-II |
| **Course Code** | ECD0805[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 8 | 8 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To increase writing skills and knowledge**(BL2-Understand)**<br>**CO2-** To enhance their mental ability**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thought**(BL4-Analyze)**<br>**CO4-** To have Dissertation works as skills development in student **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-1 | Identification of a problem and formulation of a topic of project/Thesis | PBL | BL6-Create | 15 |
| Module-2 | T0 have field work and data collection through a chosen methodology | PBL | BL6-Create | 15 |
| Module-3 | Dissertation and VIVA-VOCI | PBL | BL6-Create | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1)Electronics for you https://www.electronicsforu.com/category/electronics-projects/hardware-diy |
| **Articles** | https://www.ietlucknow.ac.in/sites/default/files/mag/Projects%20of%20Electronics%20and%20communication%20deptt._1.pdf |
| **References Books** | 1)Electronics for you https://www.electronicsforu.com/category/electronics-projects/hardware-diy |
| **MOOC Courses** | https://www.coursera.org/learn/major-engineering-project-performance |
| **Videos** | https://nptel.ac.in/courses/110104073 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | - | 1 | - | - | 1 | 2 | 3 | - | - | - | 3 | 1 | - |
| CO2 | - | 3 | 2 | 3 | - | 3 | 1 | - | 3 | 3 | - | 2 | - | 2 | 2 |
| CO3 | - | - | 3 | 3 | 3 | - | - | 3 | 3 | 3 | 1 | 2 | - | 3 | 2 |
| CO4 | - | - | - | - | - | - | 3 | 3 | 3 | 3 | 2 | 3 | - | 3 | 3 |
| CO5 | - | - | - | - | - | - | - | - | 3 | 3 | - | 3 | - | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Data Communication |
| **Course Code** | ECE0620[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | To Understand the contents and successfully complete this course, a participant must have a basic understanding of device-to-device Communication, Basics concepts of communication, digital electronics and computers. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember the concept of signals, OSI & TCP/IP reference models and discuss the functionalities of each layer in these models**(BL1-Remember)**<br>**CO2-** Understand the flow control and error control mechanisms and apply them using standard data link layer protocols **(BL2-Understand)**<br>**CO3-** To apply simple communication network using different topology **(BL3-Apply)**<br>**CO4-** To analysis the network topology and circuit for communication. **(BL4-Analyze)**<br>**CO5-** Evaluate the transport Layer Protocols (UDP, TCP) and suggest appropriate protocol in reliable/unreliable communication**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Communication, Networks Physical Structures; Different Topologies, Categories of Networks: LAN, MAN, WAN, Interconnection of Networks, The internet Protocols and Standards, Standards Organizations, Network Models, Layered Tasks, The OSI Model, Different Layers in OSI Model. TCP / IP protocol suite | lecture method/Group Discussion | 9 |
| 2 | Switching Techniques add Physical Layer: Circuit Switching, packet Switching and Message Switching Techniques, gateway, Routers, Physical. Layer Transmission Medium. Data Link Layer: Framing BSC, I {DLC, ARQ; Stop and Wait, Sliding Window, Efficiency Error and Correction, Parity Checks- CRC, Checksum (, MAC Sub layer LAN Protocols, ALOHA, Slotted ALOFIA, CSMA, CSMA/ CD, Token Bus, Token Ring. | lecture method/Project based learning | 10 |
| 3 | Need for Network Layer, Logical Addressing- IPv4 Addresses. IPv6 Addresses. Routing- Data Gram and Virtual Circuits, Dijkstra's, Bellman Ford, Distance Vector, Link State and Path Vector | lecture method/Project based learning | 10 |
| 4 | Transport Layer: Connection Oriented Transport Protocol Mechanism, TCP, TSAP, Transport Flow Regulation fragmentation and Reassemble, Session and Transport Interaction, Synchronization Points, Session Protocol Data Unit, Routing Protocol-Unicast, multicast and broadcast, Congestion Control and ATM, Traffic Management-AAL.X.25, Internal Layer | lecture method/Project based learning | 11 |
| 5 | Data Security: Synchronization, Translation, Enoyption, Decryption' Data Compression and Application Layer Protocols like: FTP, Remote Login, Virtual Terminal, and Network Management Protocols. | lecture method/Project based learning | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study the Addressing Modes of Microcontroller 8051. | Experiments | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Forouzan, A. B., (2017). Data Communications and Networking. 5th Edition, Tata McGraw-Hill |
| **Articles** | https://ieeexplore.ieee.org/document/10529194 |
| **References Books** | Alberto, L. G., & Widjaja, I. (2004). Communication Networks Fundamental Concepts and Key architectures, Tata McGraw-Hill<br>Stallings, W., (2007). Data and Computer Communication, Pearson Education<br>Larry L. Peterson, L. L., & Davie, B. S. (2007). Digital and Switching Waveforms, Elsevier |
| **MOOC Courses** | https://www.my-mooc.com/en/mooc/data-communications-and-network-services/<br>https://nptel.ac.in/courses/106105082 |
| **Videos** | https://ieeexplore.ieee.org/document/10528863 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | 3 | - | 2 |
| CO3 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | 2 |
| CO4 | - | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | - | - | 2 | - | - | - | - | - | - | - | - | - | 1 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | IoT Data Analytics |
| **Course Code** | ECE0763 [T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Open Elective | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Be able to understand the concepts and applications of IoT, and understand the core problems (e.g., networking, sensing) for building IoT systems **(BL1-Remember)**<br>**CO2-** Be able to understand and manage the knowledge of models and principles and compare the performance of key techniques for IoT data analytics**(BL2-Understand)**<br>**CO3-** Apply statistical methods to develop and evaluate the models. **(BL3-Apply)**<br>**CO4-** Analysis the data collected from different applications. **(BL4-Analyze)**<br>**CO5-** Evaluate statistical methods in EDA. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | INTRODUCTION : Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues | Lecture Method/Video Clips/Group Discussion | 10 |
| II | DATA COLLECTION AND PRE-PROCESSING: Data Collection Strategies – Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization. | Lecture Method/Video | 10 |
| III | EXPLORATORY DATA ANALYTICS: Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA. | Lecture Method/Video | 10 |
| IV | MODEL DEVELOPMENT: Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making. | Lecture Method/Video Clips/Group Discussion | 10 |
| V | MODEL EVALUATION: Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search. | Lecture Method/Video | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2-4 | Real time collected Data preprocessing | PBL | BL4-Analyze | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Jojo Moolayil Smarter Decisions: The Intersection of IoT and Data Science SAE Publication<br>Iqbal Hussein Electric and Hybrid Vehicles: Design Fundamentals CRC Press, 2003 |
| **Articles** | Al-Ali, A. R., et al. "Role of IoT technologies in big data management systems: A review and Smart Grid case study." Pervasive and Mobile Computing (2024): 101905. |
| **References Books** | Cathy O'Neil and Rachel Schutt Doing Data Science O'Reilly , 2015<br>David Dietrich, Barry Heller, Beibei Yang Toney Weir Data Science and Big data Analytics EMC 2013 |
| **MOOC Courses** | https://www.udemy.com/course/iot-data-analytics/?couponCode=24T3MT53024 |
| **Videos** | https://www.youtube.com/watch?v=Jli_jUvVAHw |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | - | 1 | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | 2 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | - |
| CO3 | - | 2 | - | 2 | - | - | - | - | - | - | - | - | 1 | - | 1 |
| CO4 | 1 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | 2 | - |
| CO5 | 1 | - | 1 | - | 2 | - | - | - | - | - | - | - | - | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Digital Image & Video Processing |
| **Course Code** | ECE0839[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To Remember various concept of Image and Video **(BL1-Remember)**<br>**CO2-** Understand the Basic concept of Image processing **(BL3-Apply)**<br>**CO3-** Apply the concept of Digital Image Processing **(BL3-Apply)**<br>**CO4-** Analyze the video technology from analog color TV systems to digital video systems, how video signal is sampled and filtering operations in video processing.**(BL4-Analyze)**<br>**CO5-** Implement and evaluate the image enhancement, edge detection and noise analysis **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Digital Image Fundamentals and Transforms: Elements of visual perception - Image sampling and quantization Basic relationship between pixels -Basic geometric transformations, Introduction to Fourier Transform and DFT Properties of 2D Fourier Transform FFT - Separable Image Transforms -Walsh – Hadamard - Discrete Cosine Transform, Haar , Slant -Karhunen - Loeve transforms | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Image Enhancement Techniques: Spatial Domain methods: Basic greylevel transformation-Histogram equalization - Image subtraction-image averaging -spatial filtering: Smoothing, sharpening filter, Laplacian filters- Frequency domain filters: Smoothing-Sharpening filters - Homomorphism filtering | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Image Restoration Model of image degradation / restoration Noise models-inverse filtering, least mean square filtering-constrained, mean square filtering , Blind image restoration-Pseudo inverse Singular value decomposition | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Image Compression: Lossless compression, Variable length coding- LZW coding Bit plane coding predictive coding-DPCM Lossy Compression, Transform coding Wavelet coding basics of image compression standards: JPEG , MPEG. Basic of Vector quantization Image Segmentation and Representation: Edge detection Thresholding -Region Based Segmentation-Boundary representation chair codes_ Polygonal approximation Boundary segments boundary descriptors Simple descriptors-Fourier descriptors regional descriptors-Simple descriptors- Texture | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | Basic Steps of Video Processing: Analog video, Digital Video, Time varying Image Formation models: 3D motion models, Geometric Image formation, Photometric Image formation, sampling of video signals, filtering operations 2-D Motion Estimation: Optical flow, general methodologies, pixel-based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding. | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Unit:2 | Image fusion and its separation finger print application on Matlab | PBL | BL4-Analyze | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1) Digital Signal, Image and Video Processing for Emerging by Byung-Gyu Kim<br>2)Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, ", 2nd edition, PHI/Pearson Education, 2002 |
| **Articles** | Digital-Image-Separation-Algorithm-Based-on-Joint-PDF-of-Mixed-Images.pd https://www.researchgate.net/publication/295179793_Digital_Image_Separation_Algorithm_Based_on_Joint_PDF_of_Mixed_Images/fulltext/56c8e12108aee3cee53d7dee/Digital-Image-Separation-Algorithm-Based-on-Joint-PDF-of-Mixed-Images.pdf |
| **References Books** | 1) M. Tekalp ,"Digital video Processing", Prentice Hall International<br>2) A.K.Jain, Fundamentals of Digital Image Processing",1st edition, Prentice Hall India, 1988 |
| **MOOC Courses** | https://www.coursera.org/courses?query=image%20processing |
| **Videos** | https://archive.nptel.ac.in/courses/117/105/117105135/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 1 | 2 | - | - | - | 3 | - | - | - | - | 1 |
| CO2 | - | 2 | 1 | - | 1 | 2 | - | - | - | 3 | - | - | - | - | 3 |
| CO3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO4 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO5 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Principles of Sensors & IoT |
| **Course Code** | ECL0102[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic definitions, key terminologies of Sensors, Smart Sensors, & IoT. **(BL1-Remember)**<br>**CO2-** To understand the working principles, concepts, & circuit designs of various sensors.**(BL2-Understand)**<br>**CO3-** To apply that how to make Sensors by using different electronic components, apply an integrated knowledge on the Sensors, work with and interpret the data obtained from various sensor applications**(BL3-Apply)**<br>**CO4-** To analyse various parameters of sensors using simulation or performing experiments on kits.**(BL4-Analyze)**<br>**CO5-** Evaluate performance of sensors & actuators for various applications.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Sensors: Sensors, Transducers, Difference between Sensor & Transducer, Different criteria to choose a sensor. Classification of Sensors: analog sensors, digital sensors, scalar sensors, vectored sensors. Need of Sensors. Temperature Sensors: Thermocouple- measuring principle and its applications, Resistive temperature detectors (RTD): used materials and construction and its applications. Thermistors: Principle and application. Comparison among Thermistor, Thermocouple, & RTD. | Audio, Video clip/Group discussion/Research/Field visit | 12 |
| 2 | Different types of Sensors: PIR sensor, Ultrasonic sensor, Gas Sensors, Proximity Sensor, Rain sensor, Touch Sensor, IR Sensor, Humidity Sensor, Semiconductor Sensors: working principle and its applications. Optical Sensors: Photodiodes, Photoresistor, PIN diode, Position Sensitive photo detectors, Pressure sensors. Chemical sensors: Electrochemical sensor, Amperometric and voltammetric sensors, potentiometric sensor, Bio sensors and applications | LectureAudio, Video clip/Group discussion/Research/Field visit | 12 |
| 3 | Smart Sensors and Actuators: Architecture of sensor node, Components of Sensor, Participatory Sensing, Wireless sensor motes and its applications: Mica2/MicaZ Motes, TelosB Motes, XM1000 wireless mote, Indriya, IRIS, iSense, Preon32, Wasp Mote, WiSense Mote, panStamp NRG Mote . Actuators: Principle, Types and Examples of Actuators, Sensor Data Communication Protocols. | Audio, Video clip/Group discussion/Research/Field visit | 12 |
| 4 | Internet of things (IoT): An Overview: Basics, definition and vision of IOT, IoT Conceptual Framework, IoT Architectural View, Physical Design of IoT, Logical Design of IoT, Applications of IoT. RFID: features, working principle, and applications. | Audio, Video clip/Group discussion/Research/Field visit | 10 |
| 5 | IoT Practical Applications: Definition & Essentials of IoT & IoT applications for: Home, Cities, Environment, Energy Systems, Retail, Logistics, Industry, Agriculture, Health & Lifestyle. | Audio, Video clip/Group discussion/Research/Field visit | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 4 | IOT based Smart specs | PBL | BL6-Create | 30 |
| 2 | smart dustbin based on iot | PBL | BL6-Create | 30 |
| 1 | To familiarize with various sensors such as LM 35 Temperature Sensor, PIR Sensor, Soil Sensor, Thermistor Sensor. | Experiments | BL6-Create | 2 |
| 1 | To study characteristics of Platinum RTD (Resistance Temperature Detector) sensor | Experiments | BL6-Create | 2 |
| 1 | To study Characteristics of NTC Thermistor sensor. | Experiments | BL5-Evaluate | 2 |
| 1 | Study the Characteristics of K Type Thermocouple. | Experiments | BL6-Create | 2 |
| 1 | Study the characteristics of Pressure Transducer/ Sensor. | Experiments | BL6-Create | 2 |
| 2 | To make a touch sensor using 555 Timer IC on Breadboard | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015 2) Shantanu Bhattacharya, A K Agarwal, Environmental, Chemical and Medical Sensors, Springer Nature Singapore Pvt. Ltd. 2018 |
| **Articles** | 10.1088/978-0-7503-2707-7ch1 |
| **References Books** | 1) Donald Norris, The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black, McGraw Hill Publication<br>Raj Kamal, Internet of Things, TMH, New Delhi. |
| **MOOC Courses** | https://courses.mooc.fi/org/uh-cs/courses/introduction-to-the-internet-of-things-mooc |
| **Videos** | http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | - | 1 | 3 | 2 | 1 | 2 | 2 | 2 | - | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 2 | 2 | 3 | 2 | - | - | 2 | - | - | 2 | 1 | 3 | 2 | 2 |
| CO5 | - | - | - | - | 1 | 2 | - | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Fundamentals of Arduino Programming |
| **Course Code** | ECL0261[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Sensors, Actuators, Interfacing of devices etc. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic definitions, key terminologies of Arduino IDE, actuators, Sensors & IoT**(BL1-Remember)**<br>**CO2-** To understand the working principles, concepts, & circuit designs of various Sensors & Actuators for IoT. **(BL2-Understand)**<br>**CO3-** To apply that how to interface with and interpret the data obtained from various IoT applications **(BL3-Apply)**<br>**CO4-** To analyse various smart systems using simulation or performing experiments on IoT builder kit**(BL4-Analyze)**<br>**CO5-** Evaluate performance of various logics & designs of sensors with IoT systems for various applications. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Arduino Boards, Arduino IDE, programming setup, Arduino Programming concepts: Syntax, Program flow, serial, Serial.begin, Arduino functions, data types variables, Arduino Array, Delay, Arduino if, loops. Arduino Sensors, control motors, Arduino Shields. | Lecture Method/Video | 12 |
| II | Introduction & Programming with IoT boards Introduction to IoT Prototype and product, IoT development boards: Arduino, Architecture of Arduino Uno, Micro duino, NodeMCU, Beagle bone Board, Intel Edison, Intel Galileo, Raspberry pi Pin configuration, different functions of Raspberry pi, Samsung ARTIK, and how to program. | Lecture Method/Video | 10 |
| III | Technologies behind IoT: Communication Technologies for IoT: ZigBee, RF links, Bluetooth, Bluetooth 4.0 LE, Wi-Fi, 6LoWPAN, Z-Wave and a comparison. | Lecture Method/Video | 10 |
| IV | IoT Enabling Technologies: Wireless sensor Networks, Examples of WSNs used in IoT Systems, Cloud computing, cloud computing services, Big Data Analytics, Examples of big data generated by IoT systems, characteristics of big data. | Lecture Method/Video/Group Discussion | 10 |
| V | Arduion Web Connecting: Arduino Shields, Ethernet Shields, Ethernet library, Ethernet client, Client Examples. Ethernet Server, WiFi Shield, WiFi Shield Demo, Arduino Libraries, EEPROM, I2C communication, Sending bits. | Lecture Method/Video/Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study 37 in one sensors. | Experiments | BL2-Understand | 2 |
| 3 | To implement an Arduino program for Analog Read. | Experiments | BL3-Apply | 2 |
| 3 | To a interface and programming of Magnetic Reed switch | Experiments | BL4-Analyze | 2 |
| 4 | To compile an Arduino program for Digital and Analog Sensor interfacing. | Experiments | BL4-Analyze | 2 |
| 3 | To compile an Arduino program for interfacing and programming of Buzzer Module. | Experiments | BL4-Analyze | 2 |
| 2 | To implement an Arduino program to interface Bluetooth Module with Arduino UNO | PBL | BL5-Evaluate | 2 |
| 2 | Automation with Arduino system for Smart Agriculture | PBL | BL6-Create | 30 |
| 3 | Automation with Sensors like Smart Lock System, Smart Waste Management System | PBL | BL6-Create | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1. Arshdeep Bahga and Vijay Madisetti "Internet of Things – A Hand-on Approach " Universities press, 2015<br>2. Donald Norris The Internet of Things: Do-It Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black McGraw Hill Publication.<br>3. Jeeva Jose Internet of Things Khanna publication, AICTE approved |
| **Articles** | 1. Adeleke, O. J., & Ogbogbono, C. O. Smart Fan Control: A Comprehensive Study on Designing and Implementing an Arduino-Based Wireless Fan Speed Control System with Smartphone Integration. Available at SSRN 4735449.<br>2. Rodriguez-Sanchez, C., Orellana, R., Fernandez Barbosa, P. R., Borromeo, S., & Vaquero, J. (2024). Insights 4.0: Transformative learning in industrial engineering through problem-based learning and project-based learning. Computer Applications in Engineering Education, e22736. |
| **References Books** | Raj Kamal Internet of Things TMH, New Delhi. |
| **MOOC Courses** | https://onlinecourses.swayam2.ac.in/aic20_sp04/preview<br>https://onlinecourses.nptel.ac.in/noc19_cs65/preview |
| **Videos** | http://www.iot-a.eu/public<br>https://www.tinkercad.com/projects/Basics-of-Arduino-TINKERCAD Online Simulator |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | 2 | - | - | - | - | 2 | 3 | - | - | - | 2 | - |
| CO2 | 2 | - | - | - | 3 | - | - | - | 1 | - | - | - | - | - | 2 |
| CO3 | - | - | 1 | - | 1 | - | - | - | - | - | - | - | 1 | 2 | - |
| CO4 | - | - | - | 2 | - | - | - | - | 1 | 2 | - | - | - | - | 3 |
| CO5 | - | - | 2 | 1 | 2 | - | - | - | 3 | - | - | - | 2 | 1 | - |
| CO6 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Semiconductor Devices |
| **Course Code** | ECL0303[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To become familiar with various types of diodes like the Schottky diode, tunnel diode, PIN diode. **(BL1-Remember)**<br>**CO2-** To understand the operation of various electronic devices like BJT, JFET, and MOSFET. **(BL2-Understand)**<br>**CO3-** To apply the concept of amplifiers to the various types of feedback amplifiers. **(BL3-Apply)**<br>**CO4-** To analyze various electronics devices and their frequency response.**(BL4-Analyze)**<br>**CO5-** To design various types of oscillators and feedback amplifiers. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | BJT: Review of device structure operation and V-I characteristics, BJT circuits at DC, BJT as amplifier and switch, biasing in BJT amplifier circuit, h-parameter model and small-signal operation, single stage BJT amplifier, BJT internal capacitances and high-frequency response, frequency response of CE amplifier. | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 2 | FET:Operation ofn-channel and p-channel JFET and MOSFET, comparison of BJT, JFET and MOSFET,MOSFET as Amplifier and switch, Biasing in MOS Amplifier circuits, small-signal operation, single stage MOS amplifier, MOSFET internal capacitances and high frequency response. | lecture method/Project based learning | 10 |
| 3 | Differential Amplifier: Four basic configurations of differential amplifiers, MOS differential pair, small signal operation of the MOS differential pair, BJT differential pair, other non-ideal characteristics of the Differential amplifier (DA). | lecture method/Project based learning | 10 |
| 4 | Feedback: The general feedback structure properties of negative feedback, four basic feedback topologies, the series shunt feedback amplifier, the series –series feedback amplifier, the shunt-shunt and shunt series feedback amplifier. Oscillator: Basic principles of sinusoidal Oscillators, op-amp RC Oscillator circuit, LC Oscillator, Hartley oscillator and Colpitt oscillator. | lecture method/Project based learning | 11 |
| 5 | Special Device: Use of PN junction diode as clipper, principle of operation of Light Emitting Diode, Schottky diode, advantages of Schottky diodes over conventional pn-junction diode, PIN diode | lecture method/Project based learning | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Design different types of Clippers using Diodes. | Experiments | BL4-Analyze | 2 |
| 2 | Electric field Detector | PBL | BL6-Create | 2 |
| 1 | To study and plot Input & Output Characteristics of BJT in Common Collector Configuration. | Experiments | BL4-Analyze | 2 |
| 2 | To study and plot Drain Characteristics of JFET in Common Source Configuration. | Experiments | BL4-Analyze | 2 |
| 4 | To study Hartley & Colpitts Oscillator and determine the frequency of oscillation. | Experiments | BL4-Analyze | 2 |
| 4 | To study Wien Bridge Oscillator and determine the frequency of oscillation. | Experiments | BL4-Analyze | 2 |
| 5 | To study and plot the characteristics of Silicon Controlled Rectifier. | Experiments | BL4-Analyze | 2 |
| 5 | mobile charger without Transformer | PBL | BL6-Create | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) Lestad, B., & Nashelsky. (2009). Electronics Devices and Circuit Theory, Pearson Education India |
| **Articles** | https://ieeexplore.ieee.org/document/4066811 |
| **References Books** | 1) Malvino, L., (2016). Electronic principles, Tata McGraw Hill 2) Sedra., & Smith., (2017). Microelectronics circuits, Oxford University Press 3) Bell, G., (2009). Electronic Devices and Circuits, Prentice-Hall 4) Jasprit Singh, Semiconductor Devices, ISBN 0-471-36245-X S. O. Kasap, Principles of electronic materials and devices, ISBN 0-07-295791-3 |
| **MOOC Courses** | https://www.coursera.org/specializations/semiconductor-devices<br>https://archive.nptel.ac.in/courses/108/108/108108122/ |
| **Videos** | https://archive.nptel.ac.in/courses/108/108/108108112/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO2 | 2 | 3 | 2 | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO3 | 2 | 2 | 3 | - | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO4 | 2 | 2 | - | 2 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO5 | 3 | 3 | - | 2 | - | - | - | - | - | - | - | 2 | 2 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Architecturing of Smart IoT Devices |
| **Course Code** | ECL0304[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Sensors, Actuators, Interfacing of devices, Arduino IDE software and Hardware | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic definitions, key terminologies of Architecture of IoT, IoT architecture standards, Communication Technologies, Networking Technologies, IoT Protocols. **(BL1-Remember)**<br>**CO2-** To understand the working principles, concepts, & circuit designs of various communication & Networking Technologies for IoT.**(BL2-Understand)**<br>**CO3-** To apply that how to these technologies work with and interpret the data obtained from various IoT applications.**(BL3-Apply)**<br>**CO4-** To analyse various IoT architecture reference models using simulation or performing experiments on IoT builder kit.**(BL4-Analyze)**<br>**CO5-** Evaluate performance of IoT systems for various applications.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG11(Sustainable cities and economies) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | IoT Architecture Reference Model (ARM): IoT an Overview, Evolution of IoT, Need for ARM, IoT conceptual framework, IoT Architectural view: reference model definition, IoT reference model by CISCO, Oracle's IoT structure, Major components of IoT devices: Physical objects, Hardware, Communication Module, Software, IoT software components for device hardware. Development tools and Open-source Framework for IoT Implementation, Platforms and Integration tools | Lecture Method/Video | 12 |
| II | Programming Raspberry Pi: Introduction to Raspberry Pi, Basic Architecture, Pin Configuration, Installation, Interfacing of Sensors, Interfacing of Actuators & Display Devices with Raspberry Pi & Programming concepts. | Lecture Method/Simulation | 12 |
| III | IoT Architecture standards: ETSI standard for IoT Architecture: Standards for IoT for Home, Energy, People, motion, City. IoT Communication Architecture: IoT nodes, IoT Edge, 6LOWPAN, IPv4/IPv6, MQTT, SMQTT, CoAP, XMPP, AMQP protocols | Lecture Method | 10 |
| IV | M2M Communication M2M Communication, M2M system Architecture: M2M device domain, M2M Network Domain, M2M application Domain, M2M applications, M2M software and development tools, Difference between M2M and IoT. | Lecture Method/Research | 10 |
| V | IoT Case studies Cloud computing, cloud computing services, how to send data on cloud platforms like thing speak, Blynk etc. IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation. | Lecture Method/Case Study | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study IoT Builder kit & its sub system. | Experiments | BL2-Understand | 2 |
| 1 | To implement a GUI python program to control LED. | Experiments | BL4-Analyze | 2 |
| 3 | To implement a python program to interface DC Motor with IoT Development Kit. | Experiments | BL5-Evaluate | 2 |
| 2 | To interface python program control Stepper motor. | PBL | BL5-Evaluate | 2 |
| 4 | To send & Visualize data on Thing speak cloud Platform using NODE MCU. | PBL | BL5-Evaluate | 2 |
| 3 | Automation projects with data sent to cloud platforms | PBL | BL6-Create | 30 |
| 5 | Smart Healthcare Projects, Smart environment Projects | PBL | | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015 |
| **Articles** | IEEE Standards Association Working Group for an Architectural Framework for the Internet of Things (IoT) (P2413) - http://grouper.ieee.org/groups/2413/ |
| **References Books** | Donald Norris The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black McGraw Hill Publication. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_cs53/preview<br>https://www.coursera.org/learn/iot-architecture<br>https://www.coursera.org/learn/raspberry-pi-interface |
| **Videos** | http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | 1 |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | - | 2 | - | 2 |
| CO3 | 1 | 2 | 1 | 3 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO4 | 1 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | - | 2 | - | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Digital Electronics |
| **Course Code** | ECL0306[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems **(BL1-Remember)**<br>**CO2-** To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations **(BL2-Understand)**<br>**CO3-** To Apply simple logical operations using combinational logic circuits [BL3]**(BL3-Apply)**<br>**CO4-** To analysis of combinational logic circuits, sequential logic circuits [BL4] **(BL4-Analyze)**<br>**CO5-** To Evaluate to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines [BL5]**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Digital Computer and Digital Systems, Number Systems & its Conversions, Complements, Binary codes, Binary Storage and Registers, Binary Logic, Integrated Circuits. Boolean Algebra–Definitions, Theorems, Properties & Function, Canonical and Standard Forms, Digital Logic Gates, Introduction to Digital Logic Families. | Audio video clip/Research/Field work/Group Discussion | 12 |
| 2 | The Map Method, Two and Three Variable Maps, Four Variable Maps, Five and Six Variable Maps, Product of Sums Simplification, NAND and NOR Implementation, Two Level Implementation, Don't–Care Conditions, Tabulation Method, Determination of Prime-Implicants, Selection of Prime- Implicants. | Audio video clip/Research/Field work/Group Discussion | 12 |
| 3 | Introduction, Design Procedure, Adders, Subtract or, Parity Generators, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive-OR and Equivalence Functions, Magnitude Comparator, Decoder, Multiplexers, PLA. | Audio video clip/Research/Field work/Group Discussion | 12 |
| 4 | Introduction, Flip-Flops, Triggering of Flip-Flops–RS, J-K, T & D, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design with State Equations, Registers, Shift, Registers, Counters. | Audio video clip/Research/Field work/Group Discussion/lecture method | 10 |
| 5 | Memory Organization: Memory Hierarchy, Secondary Memory, Main Memory Organization: Random access Memory (RAM), Read Only memory (ROM), Building large memories using small RAM and ROM chips, | Audio video clip/Research/Field work/Group Discussion/field visit | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study various Logic Gates and verify their truth tables. | Experiments | BL4-Analyze | 2 |
| 4 | To Study D & T Flip Flop and verify their truth tables. | Experiments | BL4-Analyze | 2 |
| 1 | To Verify Demorgan's Theorem and observe the output | Experiments | BL4-Analyze | 2 |
| 3 | To Study Half Adder, Full Adder and Half Subtractor and verify their truth tables | Experiments | BL4-Analyze | 2 |
| 1 | To study BCD to Excess-3 code convertor and verify its truth table. | Experiments | BL4-Analyze | 2 |
| 3 | To study and verify the truth table of 4-to-1 Line Multiplexer. | Experiments | BL4-Analyze | 2 |
| 3 | To study and verify the Truth Table of 1-to-4 Line Demultiplexer. | Experiments | BL4-Analyze | 2 |
| 4 | LED panel using seven segment | PBL | BL6-Create | 30 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) Digital Fundamentals by Morris and Mano, PHI Publication<br>Fundamental of digital circuits by A.ANANDKUMAR,PHI Publication<br>Digital Fundamaentals by FLOYD & JAIN, Pearsons Pub<br>2) Fundamentals of Logic Design by Charles H. Roth Thomson |
| **Articles** | https://www.researchgate.net/topic/Digital-Electronics |
| **References Books** | 1) Leach and Malvino, Digital Principles and Applications, TMH<br>2) W.H. Gothman, Digital Electronics, PHI<br>3)Millman and Taub : Pulse, Digital and Switching Waveform, MGH |
| **MOOC Courses** | https://www.mooc-list.com/tags/digital-electronics |
| **Videos** | https://archive.nptel.ac.in/courses/108/105/108105132/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | - | 2 | - | - | - |
| CO2 | 2 | 2 | 2 | 2 | - | - | - | - | - | 2 | - | 2 | - | - | - |
| CO3 | 2 | 2 | 2 | 2 | - | - | - | - | - | 2 | - | 2 | - | - | - |
| CO4 | 2 | 2 | 2 | 2 | - | - | - | - | - | 2 | - | 2 | - | - | - |
| CO5 | 2 | 2 | 2 | 2 | - | - | - | - | - | 2 | - | 2 | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Network Analysis & Synthesis |
| **Course Code** | ECL0307[T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Concepts of DC circuits, AC circuits, Laplace transform and Differential equation. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the concepts of basic electric circuits.**(BL1-Remember)**<br>**CO2-** To understand & gain the knowledge on basic network elements**(BL2-Understand)**<br>**CO3-** To implement the concept of TPN, RLC, RL, LC, RC circuits in other electronics devices. **(BL3-Apply)**<br>**CO4-** To analyze the various electrical and electronics hardware circuit and Gain the knowledge about network Synthesis.**(BL4-Analyze)**<br>**CO5-** To Evaluation of various electrical parameters (current, voltage, power etc.) of RLC circuits.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Development of circuit concept-R,L&C elements, Conventions for describing network- current direction & dot, Network Equations | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Transient analysis of RLC networks- RL ,LC, CR, RLC & Initial condition (Series & Parallel combinations)' | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 3 | The Laplace Transform & its Application on Network Circuits – RL, LC, CR, RLC & Initial condition (series & parallel combinations) Transform of other Signal Variables : The sifted unit step functions, The ramp & impulse function ,Waveform synthesis, The initial and Final value of f(t) from F(s), The convolution integral , convolution as a summation | Lecture Method/ Video/ Group Discussion | 10 |
| 4 | Network function: Poles and zeros, terminal pairs of ports, network function for one port and two port, the calculation of network function: ladder network general network, poles and zeros of network function, Two Port Parameters: Relation of two port variables, short circuit admittance parameters, the open circuit impedance parameters, Transmission parameters, the hybrid parameters, relation between parameters sets, parallel connection of two port network | Lecture Method / Video/ Group Discussion | 10 |
| 5 | Introduction to Network Synthesis: PRF & its properties, Basic synthesis procedure, Methods of synthesis, Driving point synthesis of one networks with two type of elements, Synthesis of RLC driving point functions. | Lecture Method / Video/ Group Discussion | 10 |

M

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | 1. To verify Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL). | Experiments | BL5-Evaluate | 2 |
| 5 | 2. Determination of the Z- Parameters of a Two-Port Network.tion of network theorems | Experiments | BL5-Evaluate | 2 |
| 3 | 3. Determination of the Y -Parameters of a Two-Port Network. | Experiments | BL5-Evaluate | 2 |
| 4 | 4. Determination of the A, B, C, D Parameters of a Two-Port Network. | Experiments | BL5-Evaluate | 2 |
| 4 | 5. Determination of the h- Parameters of a Two-Port Network. | Experiments | BL5-Evaluate | 2 |
| 2 | 6. To verify the Superposition Theorem. | Experiments | BL5-Evaluate | 2 |
| 2 | Design of RLC filters | PBL | BL6-Create | 30 |
| 2 | Verification of networks theorems | PBL | BL5-Evaluate | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | (1) Van Valkenburg M.E, Network Analysis, Prentice Hall India<br>(2) Chakrabarti, A, Circuit Theory Analysis and Synthesis, Dhanpat Rai & Co., Seventh - Revised edition<br>(3) Ravish R. Singh, Network Analysis and Synthesis, McGraw-Hill Education |
| **Articles** | (1) J. G. Gottling, "Node and mesh analysis by inspection," in IEEE Transactions on Education, vol. 38, no. 4, pp. 312-316, Nov. 1995, doi: 10.1109/13.473148. keywords: {Inspection;Linear circuits;Differential equations;Vectors;Circuit analysis;Impedance;Operational amplifiers;Coupling circuits;Mutual coupling;Coils},<br>(2) Gluskin, Emanuel. "Two Mathematical Comments on the Thevenin Theorem: An "Algebraic Ideal" and the "Affine Nonlinearity"." Mathematical Problems in Engineering 2015 (2015). |
| **References Books** | (1) D. Roy Chaudhary, Network Theory, Newage Asian<br>(2) Kuo, F, Network Analysis and Synthesis, John Wiley<br>(3) William D Stanley, Network Analysis with Applications, Pearson Education |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/108/105/108105159/ |
| **Videos** | (1) https://www.youtube.com/watch?v=0pFF1oAYgQI<br>(2) https://www.youtube.com/watch?v=O2GoxZqhlzA<br>(3) https://www.youtube.com/watch?v=GRoHyB8obfM |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | - | 2 | - | 2 |
| CO3 | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO4 | 1 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | - | 2 | - | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Electronics Circuits & Linear ICs Applications |
| **Course Code** | ECL0408[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To get familiarized with basic integrated circuit components, its designing & packaging.**(BL1-Remember)**<br>**CO2-** Understanding various operating modes of Op-amp and its linear/non-linear applications**(BL2-Understand)**<br>**CO3-** apply the concepts of transistors to understand the working of power amplifiers**(BL3-Apply)**<br>**CO4-** To analyze various operational amplifier circuits.**(BL4-Analyze)**<br>**CO5-** To evaluate the performance of various types of active filters and their design**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Integrated Circuits: Analog and Digital Integrated Circuits, Characteristics, Advantages and disadvantages of Analog and digital Integrated Circuits. Current Mirrors: Current Mirrors using BJT and MOSFETs, Simple current Mirror, Base current compensated current Mirror, Wilson and Improved Wilson Current Mirrors, Widlar Current source and Cascode current Mirror. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Operational amplifier (IC741), specifications, ideal and practical characteristics, frequency response, unity gain bandwidth, Inverting and non-inverting configurations, difference amplifier, Effect of finite open loop gain and bandwidth on circuit performance, Large signal operation of op-amp, Current to Voltage Converter, Voltage to Current Converter, Instrumentation Amplifier. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Non-Linear applications of IC Op-amps: Log–Anti Log Amplifiers, Precision Rectifiers, Peak Detectors, Sample and Hold Circuits, Analog Multipliers and their applications, Op-amp as a comparator, Zero crossing detectors, Schmitt Trigger, Astable multi vibrator, Mono stable multi vibrator, Generation of Triangular Waveforms. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Filters: Active and Passive Filters, First and second order Low Pass, High Pass, Band Pass, Band Reject and All pass active filters. Integrated Circuit Timer: The 555 Circuit, implementing a Mono stable Multi vibrator Using the 555 IC, Astable Multi vibrator Using the 555 IC. | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | Phase Locked Loop: VCO, Block diagram of PLL, Working of PLL and its applications. Power amplifier: Introduction, types, Class A, Class B, Class-AB, Class C, Class D amplifiers. | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 4 | mouse tracker circuit using 555 timer | PBL | BL6-Create | 30 |
| 1 | To study different applications of Operational Amplifier: Voltage follower, Integrator and differentiator | Experiments | BL5-Evaluate | 2 |
| 1 | To study Op-Amp. as Comparator and Zero Crossing Detector. | Experiments | BL5-Evaluate | 2 |
| 1 | To study and design Schmitt Trigger using an Op-Amp. | Experiments | BL5-Evaluate | 2 |
| 1 | To study and measure the Input Offset Voltage, Input Bias Currents, Input Offset Current, and Slew Rate of an Op-Amp. | Experiments | BL5-Evaluate | 2 |
| 4 | To study Mono stable Multi vibrator using IC 555. | Experiments | BL5-Evaluate | 2 |
| 4 | To study Astable Multi vibrator using IC 555. | Experiments | BL5-Evaluate | 2 |
| 4 | To study and design second order Low Pass Butterworth Filter. | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) Ramakant A. Gayakwad, Op Amps and Linear Integrated Circuits, Prentice Hall Publications<br>2)Integrated Electronics: Analog and Digital Circuits & Systems by Chetan D. Parikh, Christos C. Halkias, and Jacob Millman |
| **Articles** | https://ieeexplore.ieee.org/document/1082512 |
| **References Books** | 1) Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ee73/preview |
| **Videos** | https://archive.nptel.ac.in/courses/108/108/108108111/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 2 | - | - | - | - | - | 3 | - | - | - | - | 3 |
| CO2 | - | 2 | - | 2 | - | - | - | - | - | 3 | - | - | - | - | 3 |
| CO3 | - | 2 | - | 3 | - | - | - | - | - | 1 | 1 | 1 | - | - | 3 |
| CO4 | - | 1 | - | 1 | - | - | - | - | - | - | 1 | 1 | - | - | 3 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Digital System Design |
| **Course Code** | ECL0409[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of Digital system design**(BL1-Remember)**<br>**CO2-** Understand the digital systems as an activity in a larger systems design context**(BL2-Understand)**<br>**CO3-** Apply the concept of digital system design**(BL3-Apply)**<br>**CO4-** Analyze the concept of digital system design**(BL4-Analyze)**<br>**CO5-** Evaluate Programmable logic devices (PLDs) and networks of arithmetic operations.B**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Synthesis and Analysis of Synchronous Sequential Circuits: Introduction, Characterizing Equation and Description of Synchronous Sequential Machine, Realization of Flow Table from Verbal Description Moore & Mealy Models or Machines, Machines State Table and Transition Diagram, Designing of Synchronous Sequential Circuits-Sequence Detector etc., Minimization of Flow Table of Completely and Incompletely Specifies Sequential Machines | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Introduction, Fundamental Concept of Hardware / Firmware Algorithms, ASM Chart, Timing Considerations, Control Implementation, Design with Multiplexers, PLA Control. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Basic Components of a Computer, Specifications, Architecture of a Simple Microcomputer System, Programmable Logic Devices: PROM, PLE, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design Implementation using CPLDs and FPGAs. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Basic Components of a Computer, Specifications, Architecture of a Simple Microcomputer System, Programmable Logic Devices: PROM, PLE, PLAs, PALs, GAL, PEEL, CPLDs and FPGA. Design Implementation using CPLDs and FPGAs | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | Introduction to Computer-Aided Design Tools for Digital Systems Hardware Description Languages, Introduction to VHDL & Verilog, Data Objects, Classes and Data Types, Operators, Overloading, Logical Operators. Types of Delays Entity and Architecture Declaration. Introduction to Behavioral, Dataflow and Structural Models | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | 1. To implement RS Flip Flop using NAND gates and verify their truth tables. | Experiments | BL5-Evaluate | 2 |
| 1 | 2. To implement JK Flip Flop using NAND gates and verify their truth tables | Experiments | BL5-Evaluate | 2 |
| 1 | 3. To implement D and T Flip Flop using NAND gates and verify their truth tables | Experiments | BL5-Evaluate | 2 |
| 1 | 4. To implement Master Slave JK Flip-Flop and verify its truth table | Experiments | BL5-Evaluate | 2 |
| 1 | 5. Design and verify the Asynchronous Counter (Ripple Counter) | Experiments | BL5-Evaluate | 2 |
| 1 | 6. To implement a Ring Counter using Flip-Flops | Experiments | BL5-Evaluate | 2 |
| 1 | 7. To implement a Johnson Ring Counter using Flip-Flops | Experiments | BL5-Evaluate | 2 |
| 1 | Visitor counter using arduino | PBL | BL6-Create | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) R.P. Jain, Modern Digital Electronics, Tata Mc Graw Hill Company Limited. |
| **Articles** | 1) Comparative study of Moore and Mealy machine models adaptation in black soap production 10.4314/njt.v36i2.36 |
| **References Books** | 1) Morries Mano,, Digital Logic Design, PHL |
| **MOOC Courses** | https://www.coursera.org/learn/electronica-digital-bit-a-bit-disenando-circuitos-complejos |
| **Videos** | https://onlinecourses.nptel.ac.in/noc21_ee39/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | -2 | 1 | - | - | - | - | - | 1 | - | 3 | 2 | 1 | - |
| CO2 | 3 | 3 | 3 | 1 | - | - | - | - | - | 1 | - | -3 | 3 | 1 | - |
| CO3 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | - | 3 | 2 | 1 | - |
| CO4 | 3 | 3 | 2 | 1 | - | - | - | - | - | 1 | - | 3 | 3 | 1 | - |
| CO5 | 3 | 3 | 2 | 1 | 2 | - | - | - | - | 1 | - | 3 | 3 | 2 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Analog Communication |
| **Course Code** | ECL0411[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | A basic idea regarding the initial concepts of communication is enough to go through this subject. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** :To remember the properties of signals & concepts of communication**(BL1-Remember)**<br>**CO2-** To Understand basic characteristics of signal, Modulation & demodulation techniques of AM, DSB, SSB &VSB**(BL2-Understand)**<br>**CO3-** Analyzing spectrum of AM, FM signal, noise characteristics in the channel communications and the percentage of modulation in FM and AM systems**(BL3-Apply)**<br>**CO4-** To evaluation of various communication parameters (Power, Energy, Modulation index etc. )**(BL4-Analyze)**<br>**CO5-** To Design low power AM and FM transmitters and receivers. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Introduction to the signal: Definition, types of signals and their representations: continuous time/ discrete-time, periodic/non-periodic, even/odd, energy/power, deterministic/ random, unit impulse, unit step, unit ramp (and their inter relationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals | Lecture Method/ Video/ Group Discussion / Case study / Simulation | 12 |
| II | System: Classification, Linearity and Non linearity, Time invariance and Causality, impulse response, unit step response, ramp response, LTI system. Fourier Transform: Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse Fourier transform | Lecture Method/ Video/ Group Discussion / Simulation | 10 |
| III | Introduction to communication system: Elements of communication system, Types of modulation continuous and phase, modulation benefits and applications, limitation in communication, baseband communication, carrier communication, radio frequency spectrum. Noise: Classification of noise, External, Atmospheric Noise, Solar & Cosmic Noise, Industrial noise, Internal Noise, Shot noise, partition noise, Flicker Noise, Transit lime noise, thermal noise, signal to noise ratio, noise figure and its Calculation. | Lecture Method / Video/ Group Discussion | 10 |
| IV | Amplitude modulation: Amplitude modulation, time domain representation of AM Wave, frequency spectrum of AM wave, single tone sinusoidal modulation, multi tone sinusoidal modulation, power content of side bands, current calculation in AM wave, generation of AM wave, demodulation of AM wave, Suppressed carrier modulation, DSB-SC modulation generation of DSB-SC signal, SSB modulation, generation of SSB waves, detection of SSB waves, VSB modulation, generation and detection of VSB signals, comparison of various AM systems. | Lecture Method / Video/ Group Discussion | 10 |
| V | Angle Modulation: FM and PM waveforms, phase deviation, frequency deviation, modulation index, phase and frequency modulators and demodulators, frequency spectrum of angle modulated waves, bandwidth requirement for angle modulated waves, Average power of angle modulated waves, direct and indirect FM transmitters, FM Receivers, Angle Vs Amplitude modulation, FM vs PM | Lecture Method / Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study the operation of a DSB AM Modulator. | Experiments | BL5-Evaluate | 2 |
| 2 | A). To generate Amplitude Modulated wave and determine the percentage modulation. B). To Demodulate the modulated wave using Envelope Detector. | Experiments | BL5-Evaluate | 2 |
| 3 | To study the Modulation and Demodulation of a Double Side Band Suppressed Carrier Signal. | Experiments | BL5-Evaluate | 2 |
| 3 | To study the Modulation and Demodulation of a Single Side Band Suppressed Carrier Signal. | Experiments | BL5-Evaluate | 2 |
| 3 | A) To generate Frequency Modulated Signal and determine the Modulation Index and Bandwidth for various values of Amplitude and Frequency of modulating signal. B) To demodulate a Frequency Modulated Signal using FM Detector and study the Modulation and Demodulation of a Frequency Modulated Signal. | Experiments | BL5-Evaluate | 2 |
| 4 | To study the Modulation and Demodulation of a Phase Modulated Signal. | Experiments | BL5-Evaluate | 2 |
| 5 | Design of AM transmitter and Receiver | PBL | BL6-Create | 30 |
| 5 | Design of FM transmitter and Receiver | PBL | BL6-Create | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | (1) B.P. Lathi Modem Digital and Analog communication Systems 4th Edition' Oxford Press<br>(2) V Oppenheim, A.S Willsky , and S. Hamid Nawab Signals & system Pearson Education,2nd Ed |
| **Articles** | (1) Houtgast, T. "Frequency selectivity in amplitude-modulation detection." The Journal of the Acoustical Society of America 85.4 (1989): 1676-1680.<br>(2) Moore, Brian CJ, and Aleksander Sek. "Effects of carrier frequency, modulation rate, and modulation waveform on the detection of modulation and the discrimination of modulation type (amplitude modulation versus frequency modulation)." The Journal of the Acoustical Society of America 97.4 (1995): 2468-2478. |
| **References Books** | (1) Kennedy & Devis Electronic Communication System Tata McGraw Hill<br>(2) Simon Haykins Communication systems 4thEdition<br>(3) Singh and Sapre Communication Systems Tata McGraw Hill |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc21_ee74/preview |
| **Videos** | https://www.youtube.com/watch?v=iZM2zgxnEOc&t=46s |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | - | - | - | 2 |
| CO3 | 1 | 1 | 1 | 3 | 2 | - | - | - | - | - | - | - | - | - | 3 |
| CO4 | 1 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO5 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Wireless Sensor Networks & IoT |
| **Course Code** | ECL0460[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Architecture of IoT and Communication and Networking Technologies. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic terminologies of networking, sensor node architecture etc.**(BL1-Remember)**<br>**CO2-** To understand the important functions, concepts, algorithms &types of WSNs, Protocols. **(BL2-Understand)**<br>**CO3-** To apply the knowledge of programming to achieve a specific task/challenge. Gain knowledge about Power Management of WSNs**(BL3-Apply)**<br>**CO4-** To analyse the results by using computer-based tools/kits for engineering applications. Use computer programming tools to process and visualize results**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of WSN in various fields such as research and industries**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG11(Sustainable cities and economies) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Motivation for a Network of Wireless Sensor Nodes: Definitions and Background - Challenges and Constraints: Energy, Self-Management, Wireless Networking, Decentralized Management, Design Constraints, Security - Applications : Structural Health Monitoring, Traffic Control, Health Care, Pipeline Monitoring, Precision Agriculture, Active Volcano, Underground Mining | Lecture Method/Video/Virtual Lab | 12 |
| II | Node Architecture: The Sensing Subsystem, The Processor Subsystem, Communication Interfaces, Prototypes Medium Access Control: Characteristics of MAC Protocols in Sensor Networks, Contention-Free MAC Protocols, Contention-Based MAC Protocols, Hybrid MAC Protocols. | Lecture Method/Video/Virtual Lab | 12 |
| III | Network Layer: Routing Metrics, Flooding and Gossiping, Data-Centric Routing, Proactive Routing, On-Demand Routing, Hierarchical Routing, Location-Based Routing, QoS-Based Routing Protocols. | Lecture Method/Video/Virtual LabWhiteboard/PPT | 10 |
| IV | IoT with Raspberry pi: Senor motes programming with python on Raspberry pi, Interfacing concepts with python Programming and data cloud concepts with raspberry pi. Remote access of Raspberry pi with Python, Interfacing of sensors & Actuators with Raspberry Pi. Localization: Ranging Techniques, Range-Based Localization, Range-Free Localization, Event-Driven Localization | Lecture Method/Video/Virtual Lab | 10 |
| V | Integration of WSN to IoT: Integration approaches – stack-based approaches, topology-based approaches - SCADA network architecture - Security Challenges, Introduction to Simulation Tools of WSN like: NETSIM Simulation, COOJA Simulator, NS2 Simulator. Security: Fundamentals of Network Security, Challenges of Security in Wireless Sensor Networks, Security Attacks in Sensor Networks, Protocols and Mechanisms for Security, Security Protocols for Sensor Networks | Lecture Method/Research/Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To Study Sensor Node Configuration & Different Sensors with pin details. | Experiments | BL2-Understand | 2 |
| 2 | To write a Python Program for test Air Quality Sensor (SS151) with interfacing | Experiments | BL4-Analyze | 2 |
| 2 | Interfacing with Python Program for test Soil Moisture Sensor (SS152). | Experiments | BL5-Evaluate | 2 |
| 3 | Interfacing of Soil / Water Temperature Sensor (SS154). on IoT builder kit | Experiments | BL4-Analyze | 2 |
| 3 | WSN Virtual lab | PBL | BL4-Analyze | 2 |
| 4 | Netsim Tool simulation | PBL | BL5-Evaluate | 10 |
| 3 | IoT based system design and implementation | PBL | BL6-Create | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1. Dr Xuemin (Sherman) Shen Dr Yi Pan Fundamentals of Wireless Sensor Networks, Theory & Practices Wiley Series on Wireless Communications and Mobile Computing<br>2. Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015 |
| **Articles** | Karan Bajaj, Bhisham Sharma, and Raman Singh Integration of WSN with IoT Applications: A Vision, Architecture, and Future Challenges Springer Nature Switzerland AG 2020<br>Integration of WSN with IoT Applications: A Vision, Architecture, and Future Challenges Springer Nature Switzerland AG 2020<br>Akyildiz, I.F.; Su, W.; Sankarasubramaniam, Y.; Cayirci, E. Wireless Sensor Networks: A Survey. Comput. Netw. 2002, 38, 399–422. |
| **References Books** | |
| **MOOC Courses** | https://www.coursera.org/learn/iot-wireless-cloud-computing<br>https://archive.nptel.ac.in/courses/106/105/106105160/ |
| **Videos** | http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | 1 | 2 | 2 | 2 |
| CO3 | 1 | 1 | 1 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO4 | 1 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | 2 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Digital Communication |
| **Course Code** | ECL0513[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of Digital communication **(BL1-Remember)**<br>**CO2-** Understanding practical implementation issues, such as non-ideal filters, non-ideal sampling pulses, aliasing, and intersymbol-interference (ISI)[BL2] **(BL2-Understand)**<br>**CO3-** Apply error control coding techniques for efficient communication [BL3]**(BL3-Apply)**<br>**CO4-** To analyze digital pulse modulation techniques [BL4]**(BL4-Analyze)**<br>**CO5-** Evaluate fundamental communication system parameters, such as bandwidth, power and signal to quantization noise ratio and data rate**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Cumulative distribution function, Probability density, Mean, Variance and standard deviations of random variable, Gaussian distribution, Error function, Correlation and autocorrelation, Central-limit theorem, Error probability, Power Spectral density of digital data | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Sampling, sampling theorem for low pass and band pass signal Types of Sampling, Instantaneous, Natural and Flat Top, Aperture Effect, Pulse Amplitude Modulation (PAM), Channel Bandwidth for PAM, Pulse Position and Pulse Duration Modulation and Demodulation Channel Bandwidth for PAM, PWM, PPM, Compression of PAM,PWM,PPM, Time Division Multiplexing (TDM), Frequency division multiplexing | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Quantization, Quantization Error, Pulse Code Modulation (PCM), Signal to- Noise Ratio in PCM, Data Rate and Bandwidth of Multiplexed PCM Signal, Inter-symbol Interference, Commanding, Differential PCM (DPCM), Delta Modulation (DM), Adaptive Delta Modulation (ADM), Compression of pulse Digital modulation technique, Frequency Division Multiplexing, TDMA, Compression between FDMA AND TDMA | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Analysis' Generation and Detection, ASK, BPSK,BFSK, Spectrum and bandwidth analysis of ASK,BPSK,BFSK, Differential phase shift eying (DPSK), Quadrature phase shift keying (QPSK),M-ary PSK, Quadrature, M-ary Frequency shift keying ,Minimum shift keying, Quadrature amplitude modulation(QAM) | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | Information Theory, Information, entropies (Marginal and Conditional), Model of a communication system, Binary symmetric channel (BSC), Binary error channel (BEC), Shannon Fano and Huffman coding methods and their efficiency | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Sampling and Reconstruction of an Analog Signal | Experiments | BL4-Analyze | 2 |
| 4 | Generation and Detection of a Quadrature Phase Shift Keying (QPSK) signal | Experiments | BL5-Evaluate | 2 |
| 3 | PBL based on delta modulation circuit | PBL | BL6-Create | 25 |
| 2 | Generation and Detection of a Pulse Position Modulated (PPM) signal. | Experiments | BL4-Analyze | 2 |
| 4 | Generation and Detection of a Time Division Multiplexed (TDM) signal | Experiments | BL4-Analyze | 2 |
| 4 | Generation and Detection of a Pulse Code Modulated (PCM) signal. | Experiments | BL4-Analyze | 2 |
| 4 | Generation and Detection of an Amplitude Shift Keying (ASK) signal | Experiments | BL4-Analyze | 2 |
| 1 | Generation and Detection of a Frequency Shift Keying (FSK) signal | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1) H, P. HSU & D Mitra,Analog and Digital Communications,, 2nd Edition' Tata McGraw-Hill Publishing . |
| **Articles** | https://www.researchgate.net/publication/371531206_Digital_Communication |
| **References Books** | 1) B.P. Lathi, Modem Digital and Analog communication Systems",2nd Edition' Tata McGraw-Hill Publishing Company Ltd<br>2)Singh and Sapre, Communication Systems.<br>3) Simon Haykin, Communication System,TMH |
| **MOOC Courses** | https://www.udemy.com/course/digital-communication-information-theory/?utm_source=adwords&utm_medium=udemyads&utm_campaign=DSA_Catchall_la.EN_cc.INDIA&campaigntype=Search&portfolio=India&language=EN&product=Course&test=&audience=DSA&topic=&priority=&utm_content=deal4584&utm_term=_._ag_82569850245_._ad_533220805577_._kw__._de_c_._dm__._pl__._ti_dsa-393783612853_._li_1007795_._pd__._&matchtype=&gad_source=1&gclid=Cj0KCQjw6PGxBhCVARIsAlumnWYxPKj0B9Wj0ROnVdPVCHIKAMEAanGikdpssQDsXsOnCjYgVL04ch8aAlA6EALw_wcB&couponCode=IND21PM |
| **Videos** | https://nptel.ac.in/courses/117101051 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO2 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | - | - |
| CO3 | 2 | 3 | - | 1 | - | - | - | - | - | - | - | - | 2 | - | - |
| CO4 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | - | - |
| CO5 | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Advanced Microprocessors and Interfacing |
| **Course Code** | ECL0515[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Digital System Design Course | | | **Co-Requisite/s** | Understanding the prerequisites of digital system design | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.**(BL1-Remember)**<br>**CO2-** Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller**(BL3-Apply)**<br>**CO3-** Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.**(BL4-Analyze)**<br>**CO4-** Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.**(BL5-Evaluate)**<br>**CO5-** Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements**(BL5-Evaluate)**<br>**CO6-** To train their practical knowledge through laboratory experiments.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Prerequisite: Basic understanding of Digital electronics, number system and conversion. Introduction to microprocessor, Evolution of Microprocessors' Overview of 8 bit microprocessor (8085): Pin configuration and Internal architecture' Registers, ALU. Interrupts. Assembly language programming' | lecture method/Group Discussion | 8 |
| 2 | I6 bit Microprocessor (8086) - Register organization, Architecture of 8086- BIU and EU, Memory Segmentation, Pin description' Memory Addressing,' Maximum and Minimum Modes of operation along with timing diagram' Clock generator 8284. | lecture method/Project-based Learning | 10 |
| 3 | Addressing Modes, Instruction set of 8086, Assembly Language Programming, Assembler Directives and operators, Procedures, Macros, Interrupts, 8086 Based Multiprocessor Systems- Coprocessors (8087 NDP). | lecture method/Project-based Learning | 10 |
| 4 | Peripheral Interfacing: 8255 Programmable peripheral interface, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, DMA Controller. | lecture method/Project-based Learning | 12 |
| 5 | 80186 Architecture, Enhancements of 80186-80286,Architecture-Real and Virtual addressing modes-80386 Architecture special Registers-Memory Management Memory Paging Mechanism 80486 Architecture Enhancements Cache Memory Techniques Exception Handling, Brief comparative overview of Pentium and Core I version of processors | lecture method/Project-based Learning | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Write 8085 Assembly Language Program for Addition of two 8-bit numbers and Sum is 8 bit | Experiments | BL3-Apply | 2 |
| 10 | Digital Energy Meter LCD display | PBL | BL6-Create | 2 |
| 3 | Write 8085 Assembly Language Program for Decimal Addition of two 8-bit numbers and Sum is 8 bit. | Experiments | BL3-Apply | 2 |
| 4 | Write 8085 Assembly Language Program for 2's Complement of an 8-bit numbers. | Experiments | BL5-Evaluate | 2 |
| 5 | Write 8085 Assembly Language Program for finding the smallest number in an array of five different 8 bit numbers. | Experiments | BL5-Evaluate | 2 |
| 6 | To study the Addressing Modes of Intel 8085 Microprocessor. | Experiments | BL2-Understand | 2 |
| 7 | To interface Programmable Peripheral Interface 8255 with 8085 and study its characteristics in Mode0, Mode1 and BSR Mode. | Experiments | BL6-Create | 2 |
| 8 | To interface 8253 Interface Board with 8085 □p and verify the operation of 8253 in six different modes. | Experiments | BL6-Create | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Ray, A.K. & Burchandi, K.M., (2012). Advanced Microprocessors and peripherals Architecture, Programming and interfacing. McGraw Hill (India) Private Limited. |
| **Articles** | https://ieeexplore.ieee.org/document/9983881 |
| **References Books** | Brey, B.B., (2008).The Intel Microprocessors, Architecture , Programming and Interfacing. Pearson Education. |
| **MOOC Courses** | https://www.udemy.com/topic/microprocessors/<br>https://onlinecourses.nptel.ac.in/noc23_ee06/preview |
| **Videos** | https://ieeexplore.ieee.org/document/10119125 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | - | 1 | 1 | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO3 | - | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | 2 | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Digital Signal Processing |
| **Course Code** | ECL0519[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Fourier Series, Fourier Transform, Laplace Transform, Z-Transform, Difference & Differential Equations. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic terminologies of Signals, Systems & basic operations etc. **(BL1-Remember)**<br>**CO2-** To understand the concepts of trigonometry, complex algebra, Fourier transform, z-transform to analyze the operations on signals and acquire knowledge about Systems **(BL2-Understand)**<br>**CO3-** To apply the principles of discrete-time signal analysis to perform various signal operations and apply the principles of Fourier Transform analysis to describe the frequency characteristics of discrete-time signals and systems**(BL3-Apply)**<br>**CO4-** To analyze the signals & systems by using computer programming tools to process and visualize signals & Systems **(BL4-Analyze)**<br>**CO5-** To evaluate signal processing strategies at multidisciplinary activities.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Introduction:Introduction to DSP, Discrete-Time Signals, Discrete-Time Systems, Analysis of Discrete-Time Linear Time-Invariant Systems, Discrete Time Systems described by Difference Equation, Implementation of Discrete-Time Systems, Signal Flow Graph representation of Digital Network. | Lecture Method/Video | 12 |
| II | Discrete Time Fourier Transform(DTFT): Concept of frequency in discrete and continuous domain and their relationship (radian and radian/sec), freq. response in the discrete domain. Discrete system's response to sinusoidal/complex inputs (DTFT), Representation of LTI systems in complex frequency domain. Z- Transforms: Definition, mapping between s-plane & z-plane, unit circle, convergence and ROC, properties of Z-transform, Z-transform on sequences with examples & exercises, characteristic families of signals along with ROC, convolution, correlation. Discrete Fourier Transforms: Definitions, Properties of the DFT, Circular Convolution, Linear Convolution. | Lecture Method/Video | 12 |
| III | Realization of Digital Systems: Introduction, Direct Form Realization of IIR Systems, Cascade Realization of an IIR System, Parallel Form Realization of an IIR System, Ladder Structures: Continued Fraction Expansion of H (z), Example of Continued Fraction, Realization of a Ladder Structure, Example of a Ladder Realization Fast Fourier Transform Algorithms: Introduction, Decimation-In Time(DIT) Algorithm, Computational Efficiency, Decimation in Frequency(DIF) Algorithm. | Lecture Method/Video | 10 |
| IV | Finite Impulse Response Filter Design: Windowing and the Rectangular Window, Other Commonly Used Windows Examples of Filter Designs Using Windows, The Kaiser Window | Lecture Method/Video | 10 |
| V | Design of Infinite Impulse Response Digital Filters; Introduction to Filters, Impulse Invariant Transformation, Bi-Linear Transformation, All-Pole Analog Filters: Butterworth and Chebyshev, Design of Digital Butterworth and Chebyshev Filters | Lecture Method/Video | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2 | PPG Signal processing | PBL | BL5-Evaluate | 10 |
| 3 | To implement a MATLAB program for computation of N point DFT of a given sequence and to plot magnitude and phase spectrum using DFT. | Experiments | BL4-Analyze | 2 |
| 2 | To write a MATLAB program for Auto and cross correlation of two sequences. | Experiments | BL4-Analyze | 2 |
| 3 | Write a MATLAB Program to Obtain Linear Convolution of Two Finite Length Sequence | Experiments | BL5-Evaluate | 2 |
| 2 | To implement a MATLAB program for computation of N point DFT of a given sequence and to plot magnitude and phase spectrum using DFT. | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1. Salivahanan Digital Signal Processing TMH<br>2. John C Prokias, Dimitris G Manolakis, "Digital Signal Processing", Pearson Education' |
| **Articles** | Tessier, R., & Burleson, W. (2001). Reconfigurable computing for digital signal processing: A survey. Journal of VLSI signal processing systems for signal, image and video technology, 28, 7-27. |
| **References Books** | 1. Oppenheim & Schafer Digital Signal Processing PHI<br>2. Johnny R. Johnson, "Digital Signal Processing", PHI |
| **MOOC Courses** | https://nptel.ac.in/courses/117102060 |
| **Videos** | https://nptel.ac.in/courses/117102060 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | 2 | - | - | - | 3 | - | - | 2 | - | - |
| CO2 | 3 | 1 | 1 | - | - | 2 | - | - | - | 3 | - | - | 3 | - | 2 |
| CO3 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 3 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 2 | 1 | - | 2 | - | - | - | - | - | - | - | - | 1 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Antenna & Wave Propagation |
| **Course Code** | ECL0617[IT] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Basic concepts on electromagnetic waves and a good hold on communication systems. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To get familiarized with various antennas and their parameters.**()**<br>**CO2-** To understand various types of antenna and modes of propagation**(BL2-Understand)**<br>**CO3-** To apply the concept of the principle of pattern multiplication to antenna arrays.**(BL3-Apply)**<br>**CO4-** To analyze various type antennas and various modes of propagation. es of dipol**(BL4-Analyze)**<br>**CO5-** To evaluate the performance of various types of antennas and antenna arrays and their design.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Antennas Basics Introduction, Basic Antenna Parameters: Radiation Pattern, Beam Area or Solid Angle, Radiation Power Density, Radiation Intensity, Antenna Gain, Directivity, Effective Apertures, Resolution, Effective Height, Antenna Bandwidth, Input Impedance, Beam Width, Polarization, Antenna Radiation Efficiency, RADAR Range Equation, Radiation Resistance, Antenna Temperature. | Lecture Method / Video/ Group Discussion / Case study / Simulation | 12 |
| 2 | Point Sources and Arrays Introduction, Point Sources, Arrays of Two Isotropic Point Sources, Non-isotropic but Similar Point Sources, Principle of Pattern Multiplication, Linear Arrays of n-isotropic Point Sources of Equal Amplitude and Spacing, Broadside Array and End Fire Array, Linear Broadside Array with Non-uniform Amplitude Distributions with Binomial Array and Dolph-Tchebyscheff Arrays. | Lecture Method/ Video/ Group Discussion / Case study / Simulation | 10 |
| 3 | Dipole Antenna Infinitesimal Dipole and Small Dipole: Radiated Fields, Power Density and Radiation Resistance, Field Regions, Directivity, Effective Aperture. Region Separation: Fraunhofer Region, Radiating Near Field Region, Reactive Near Field Region. | Lecture Method / Video/ Group Discussion / Simulation | 10 |
| 4 | Wave Propagation Fundamental Equation for Free Space Propagation, Modes of Propagation: Ground wave Propagation, Sky Wave Propagation, Critical Angle and Critical Frequency, Virtual Height, Skip Distance and LUF, MUF. Space Wave Propagation: LOS, Effective Earth Radius, Effect of Earths Curvature on Tropospheric Propagation. | Lecture Method/ Video/ Group Discussion / Simulation | 10 |
| 5 | Types of Antennas: Yagi-Uda Antenna, Loop Antenna. Helical Antenna, Log-Periodic Antenna, Horn Antenna, Micro Strip Antennas: Rectangular Patch and Circular Patch Antenna. Reflector Antennas Flat Sheet Reflectors, Corner Reflectors, The Parabolic Reflectors. | Lecture Method/ Video/ Group Discussion / Case study / Simulation | 10 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | (1) C. A. Balanis Antenna Theory Analysis and Design Wiley India Pvt. Ltd<br>(2) K. D. Prasad, Antennas and Wave Propagation Satya Prakashan. |
| **Articles** | (1) Ojha, S.S., Tomar, R.S., Akashe, S., Dhakad, B., Mishra, S., Sharma, M. (2023). Dual-Band Antenna and Low Pass Filter Design for Wireless Energy Harvesting. In: Tomar, R.S., et al. Communication, Networks and Computing. CNC 2022. Communications in Computer and Information Science, vol 1893. Springer, Cham. https://doi.org/10.1007/978-3-031-43140-1_21<br>(2) Bellofiore, Salvatore, et al. "Smart-antenna systems for mobile communication networks. Part 1. Overview and antenna design." IEEE Antennas and Propagation Magazine 44.3 (2002): 145-154. |
| **References Books** | (1) R. E. Collin, Antennas and Wave Propagation, WileyIndia Pvt. Ltd.<br>(2) A. R. Harish and M. Sachidananda Antennas and Wave Propagation Press.Oxford University Press<br>(3) John D Krauss, Ronald J Marhefka and Ahmad S. Khan, Antennas and Wave Propagation TMH, New Delhi |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc20_ee20/preview |
| **Videos** | https://www.youtube.com/watch?v=t-AP3ya8Pao |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | - | 3 | - | 2 |
| CO3 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 1 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | - | 2 | - | - | - | - | - | - | - | - | 1 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Micro controller & Embedded System |
| **Course Code** | ECL0618[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Digital System Design Course | | | **Co-Requisite/s** | Understanding the prerequisites of digital system design | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic terminologies of Microcontrollers, Microprocessors & Embedded Systems**(BL1-Remember)**<br>**CO2-** To understand the important functions, concepts & architecture of microcontrollers. **(BL2-Understand)**<br>**CO3-** To apply the knowledge of microcontroller programming and system to perform a specific task**(BL3-Apply)**<br>**CO4-** To analyse the results by using computer-based tools/kits for engineering applications. Use computer programming tools to process and visualize I/O Peripheral operations.**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of microcontrollers in various fields such as research and industries **(BL5-Evaluate)**<br>**CO6-** To create/provide solutions for real world embedded systems. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction, Microcontrollers and Embedded Processors, Overview of the 8051, Inside the 8051, Addressing Modes of 8051. | Lecture method/Group Discussion | 10 |
| 2 | Introduction to 8051 Assembly Language Programming, Assembling and Running an 8051 Program, The Program Counter and ROM Space in the 8051, 8051 Data Types and Directives, 8051 Flag Bits and the PSW Register, 8051 Register Banks and Stack, 8051 I/O Programming, I/O Bit Manipulation Programming | Lecture method/Project based learning | 12 |
| 3 | Programming the 8051 Timers, Counter Programming, Basics of Serial Communications, 8051 Connection to RS-232, 8051 Serial Port Programming in Assembly Language. | Lecture method/Project based learning | 12 |
| 4 | 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Interrupts Priority in the 8051. | Lecture method/Project based learning | 12 |
| 5 | Interfacing with 8051: Memory Address Decoding 8031 / 51 Interfacing with External ROM, 8051 Data Memory Space, LCD, Keyboard, Parallel and Serial ADC, DAC Interfacing, Stepper Motor and DC Motor. PIC Microcontrollers: PIC Micro-Controllers-Overview; Features, PIC-18 Architecture. | Lecture method/Project based learning | 14 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study the Addressing Modes of Microcontroller 8051. | Experiments | BL2-Understand | 2 |
| 3 | To move block of data bytes present in internal memory with starting address 10H and ending address 20H to the destination memory with starting address 30H. | Experiments | BL4-Analyze | 2 |
| 4 | To find the Factorial of a number. | Experiments | BL4-Analyze | 2 |
| 5 | To convert a BCD number into its equivalent ASCII code. | Experiments | BL5-Evaluate | 2 |
| 6 | To generate a Square Wave of 50% Duty Cycle having frequency 5 KHz at port pin P1.0. | Experiments | BL5-Evaluate | 2 |
| 7 | To generate external interrupt INT0 and INT1 by connecting push button switch. Glow LEDs connected at port P1 one by one when interrupt INT0 occurs. LEDs should flash when interrupt INT1 occurs. | Experiments | BL6-Create | 2 |
| 8 | To transmit letter "E" continuously using serial port. | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Mazidi, M.A., & Mazidi, J. G. (2007). The 8051 Microcontroller and Embedded Systems. Pearson Education |
| **Articles** | https://ieeexplore.ieee.org/document/10497037 |
| **References Books** | Ayala, K. (2007). The 8051 Microcontroller. Third Edition, Cengage Learning. |
| **MOOC Courses** | https://www.mooc-list.com/tags/microcontrollers#google_vignette<br>https://onlinecourses.nptel.ac.in/noc20_cs14/preview |
| **Videos** | https://ieeexplore.ieee.org/document/10493392 |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | - | 3 | - | 2 |
| CO3 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 1 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | - | 2 | - | - | - | - | - | - | - | - | 1 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Machine Learning |
| **Course Code** | ECL0662[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Linear Algebra and Statistics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of machine learning.**(BL1-Remember)**<br>**CO2-** To understand the basic concepts of machine learning, various machine learning models, Performance Evaluation techniques and how to improve the performance of the Machine Learning models.**(BL2-Understand)**<br>**CO3-** To implement various Machine Learning Models.**(BL3-Apply)**<br>**CO4-** To train & test machine Learning Models. **(BL4-Analyze)**<br>**CO5-** To evaluate the performance of Machine Learning Models.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Introduction: Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning Important concepts of machine learning: Parametric vs non-parametric models, the trade-off between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias-variance trade off, overfitting, model selection, no free lunch theorem. | Lecture Method/Video Clips | 12 |
| II | Linear Regression: Linear regression, estimating the coefficients, accessing the accuracy of coefficient estimates, accessing the accuracy of the model, multiple linear regression, qualitative predictors Classification: Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, Bayes' theorem of classification, LDA for p=1, LDA for p>1, quadratic discriminant analysis | Lecture Method/Video Clips/Simulation | 10 |
| III | Resampling Methods, Model Selection and Regularization: Cross- validation, leave-one-out crossvalidation, k-fold cross-validation, the bootstrap, subset selection, shrinkage methods, ridge and lasso regression, dimension reduction methods, principal components regression, partial least square. Tree Based Methods: Advantages and disadvantages of trees, regression Trees, classification trees, bagging, random forest, boosting. | Lecture Method/Video clip/Simulation | 12 |
| IV | Support Vector Machine: Maximum margin classifier, classification using a separating hyperplane, the maximal margin classifier, support vector classifier, support vector machines, classification with non-linear decision boundaries, support vector machine, one-versus-one classification, one- Versus many classification. | Lecture Method/Video Clips/Simulation | 10 |
| V | Unsupervised Learning and Reinforcement Learning: Principle component analysis, what are principal components, clustering methods, k- means clustering, hierarchical clustering, Independent component analysis, latent semantic indexing, Markov Models, Hidden Markov Models, Reinforcement Learning. | Lecture Method/Video | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Write a program to handle missing value for .csv file. | Experiments | BL5-Evaluate | 2 |
| 1 | Write a program to Pre-processing of data for.csv file. | Experiments | BL4-Analyze | 2 |
| 2 | Write a program to implement Logistics Algorithm for .csv file. | Experiments | BL5-Evaluate | 2 |
| 3 | Write a program to implement Decision Tree Algorithm for .csv file. | Experiments | BL5-Evaluate | 2 |
| 5 | Heart Disease Prediction | PBL | BL5-Evaluate | 20 |
| 4 | Brain Tumor Detection and Prediction System | PBL | BL5-Evaluate | 6 |
| 4 | Crop/Plant Disease Detection & Prediction System | PBL | BL6-Create | 20 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Aurélien Géron Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems |
| **Articles** | B. D. Shivahare, S. Suman, S. S. N. Challapalli, P. Kaushik, A. D. Gupta and V. Bibhu, "Survey Paper: Comparative Study of Machine Learning Techniques and its Recent Applications," 2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM), Gautam Buddha Nagar, India, 2022, pp. 449-454, doi: 10.1109/ICIPTM54933.2022.9754206. |
| **References Books** | D. E. Goldberg Genetic Algorithms in Search, Optimization & Machine Learning Pearson |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc23_cs18/preview |
| **Videos** | https://www.youtube.com/watch?v=fC7V8QsPBec |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 2 | 1 | - | 3 | - | - | - | - | - | - | 2 | - | 1 | 2 |
| CO3 | 1 | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO4 | 2 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | 2 | - | - | - | - | - | - | 1 | - | - | - | 1 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Microwave Engineering |
| **Course Code** | ECL0723[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of analog & digital communication and concept of EMT | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the concept of electromagnetic theory.**(BL1-Remember)**<br>**CO2-** To understand basic concepts and applications of microwave systems.**(BL2-Understand)**<br>**CO3-** To solve problems related to microwave transmission lines, microwave waveguide.**(BL3-Apply)**<br>**CO4-** To analyze, test and use various passive microwave components for different applications.**(BL4-Analyze)**<br>**CO5-** To evaluation of various characteristic and microwave parameters like VSWR, impedance, power, wavelength etc. of microwave devices.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to waveguide: General Representation of EM Field in terms of TEM, TE and TM Components, Uniform Guide Structures, Rectangular Waveguides, Circular Waveguides, Solution in terms of Various Modes, Degenerate Modes, Dominant Modes, Power Transmission and Power Loss, Excitation of Waveguides, Introduction to Micro strip Line. | Lecture Method / Video/ Group Discussion / Case study / Simulation | 12 |
| 2 | Microwave Networks and Components: Transmission Line Ports of Microwave Network, Scattering Matrix, Properties of Scattering Matrix of Reciprocal, Non Reciprocal, Loss less, Passive Networks, Examples of Two, Three and Four Port Networks, Waveguide Components; Attenuator, Phase Shifters and Couplers, Principle of Operation and Properties of E-plane, H-plane, Tee Junctions of Waveguides, Hybrid T, Multi-hole Directional Coupler, Directional Couplers, Microwave Resonators- Rectangular. | Lecture Method / Video/ Group Discussion / Simulation | 10 |
| 3 | Microwave Solid State Devices and Application: PIN Diodes, Properties and Applications, Microwave Detector Diodes, Detection Characteristics, Varactor Diodes, Parametric Amplifier Fundamentals, Manley-Rowe Power Relation, Amplifiers, Transferred Electron Devices, Gunn Effect, Various Modes of Operation of Gunn Oscillator, IMPATT, TRAPATT and BARITT. | Lecture Method / Video/ Group Discussion / Simulation | 10 |
| 4 | Microwave Vacuum Tube Devices: High Frequency Limitations, Principle of Operation, Performance and Application of; Klystron, Multi Cavity Klystron, Reflex Klystron, Principle of Operation, Performance and Applications of Magnetron and TWT, Slow Wave Structures, Approximate Gain Relationship in Forward Wave TWT. | Lecture Method / Video/ Group Discussion | 10 |
| 5 | Microwave Measurements: Measurement of Power, High, Medium and Low-Level Power Measurement Techniques, Wavelength, Impedance, Attenuation, Slotted Line Arrangement and VSWR Meter, Microwave Bench Components and Source Modulation. | Lecture Method / Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | 1. To Study the characteristics of the reflex Klystron tube and to determine its electronic tuning range. | Experiments | BL5-Evaluate | 2 |
| 2 | 2. To determine the frequency and wave length in a rectangular waveguide working in TE10 mode. | Experiments | BL5-Evaluate | 2 |
| 3 | 3. To determine the standing - wave ratio and reflection coefficient. | PBL | BL5-Evaluate | 2 |
| 3 | 4. To study the attenuator (fixed and variable type). | Experiments | BL5-Evaluate | 2 |
| 4 | 5. To study the function of multi hole directional coupler by measuring the following parameters 1. Mainline and auxiliary-line VSWR 2. The coupling factor and directivity of the coupler. | Experiments | BL5-Evaluate | 2 |
| 5 | 6. To study the isolator and circulators. | Experiments | BL5-Evaluate | 2 |
| 5 | Design of Novel Multi-Band Antenna for Satellite Applications | PBL | BL6-Create | 30 |
| 4 | Design of Compact Size Tri-Band Stacked Patch Antenna for GPS and IRNSS Applications | PBL | BL6-Create | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | (1) D.M. Pozar, Microwave Engineering, John Wiley & Sons |
| **Articles** | (1) Banik, S. B. A. S. G. S., Sanghamitra Bandyopadhyay, and S. Ganguly. "Bioeffects of microwave—a brief review." Bioresource technology 87.2 (2003): 155-159.<br>(2) Seeds, Alwyn J., and Keith J. Williams. "Microwave photonics." Journal of lightwave technology 24.12 (2006): 4628-4641. |
| **References Books** | (1) Samuel Y Liao, Samuel Y Liao, Prentice Hall of India<br>(2) Das Microwave EngineeringTMH<br>(3) Collins Foundations of Microwave Engineering Wiley India<br>(4) Rao Microwave Engineering PHI Learning |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_ee103/preview |
| **Videos** | https://www.youtube.com/watch?v=NW1NXoM4q5c |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | - | 1 | 1 | - | - | 2 | - | - | - | 3 | - | - | 1 | - | 2 |
| CO3 | 1 | 1 | 1 | 3 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO4 | 1 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Optical Fiber Communication |
| **Course Code** | ECL0825[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Basic concept of communication and ray optics. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember basic elements of optical fiber transmission link, fiber modes, configurations and structures.**(BL1-Remember)**<br>**CO2-** To understand the different kind of losses and signal distortions in fibers.**(BL2-Understand)**<br>**CO3-** To apply various laws and theory of ray optics to understand the working of optical fiber communication system**(BL3-Apply)**<br>**CO4-** To analyze signal degradation in optical fiber.**(BL4-Analyze)**<br>**CO5-** To evaluate the performance fiber optic transmission system. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Introduction to Optical Fibers Evolution of fiber optic system, Element of an Optical Fiber Transmission link, Ray Optics, Optical Fiber Modes and Configurations-Mode theory of Circular Wave guides, Overview of Modes, Key Modal concepts, Linearly Polarized Modes, Single Mode Fibers, Graded Index fiber structure. | Lecture Method / Video/ Group Discussion / Simulation | 12 |
| II | Signal Degradation Optical Fibers Attenuation - Absorption losses, scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides, Information Capacity determination, Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers, Mode Coupling, Design Optimization of SM fibers, RI profile and cut-off wavelength. | Lecture Method / Video/ Group Discussion / Simulation | 10 |
| III | Fiber Optical Sources and Coupling Direct and Indirect Band gap materials-LED structures ,Light source materials, Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition, Rate equations -External Quantum efficiency, Resonant frequencies, Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers, Power Launching and coupling, Lancing schemes, Fibre-to-Fibre joints, Fibre splicing. | Lecture Method / Video/ Group Discussion / Simulation | 10 |
| IV | Fiber Optical Receivers PIN and APD diodes, Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise, Comparison of Photo detectors, Fundamental Receiver Operation, preamplifiers, Error Sources -Receiver Configuration, Probability of Error, Quantum Limit. | Lecture Method / Video/ Group Discussion | 10 |
| V | Digital Transmission System: Point-to-Point links System considerations, Link Power budget, Rise - time budget, Noise Effects on System Performance, Operational Principles of WDM, Solitons-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network. | Lecture Method / Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | The Study of a 650nm fiber optic analog link. | Experiments | BL5-Evaluate | 2 |
| 2 | Study of a 650nm fiber optic digital link. | Experiments | BL5-Evaluate | 2 |
| 3 | To measure propagation or attenuation loss in optical fiber. | Experiments | BL5-Evaluate | 2 |
| 4 | To measure propagation loss in optical fiber using optical power meter | Experiments | BL5-Evaluate | 2 |
| 4 | To measurement of the Numerical Aperture (NA) of the fiber. | Experiments | BL4-Analyze | 2 |
| 5 | Study of Intensity Modulation Technique using Analog input signal. To obtain intensity modulation of the analog signal, transmit it over a fiber optic cable and demodulate the same at the receiver and to get back the original signal. | Experiments | BL5-Evaluate | 2 |
| 5 | Design of WDM system | PBL | BL6-Create | 30 |
| 5 | Design of multi user OFC system | PBL | | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | (1) Gerd Keiser Optical Fiber Communication 3rd Edition McGraw Hill International, |
| **Articles** | (1) B. Dhakad, R. S. Tomar, S. Mishra, S. S. Ojha, M. Sharma and S. Akashe, "Design and Analysis of Low BER with High Speed 16 Channel WDM Communication Network for 5G and Beyond," 2023 1st International Conference on Innovations in High Speed Communication and Signal Processing (IHCSP), BHOPAL, India, 2023, pp. 541-546, doi: 10.1109/IHCSP56702.2023.10127201. keywords: {Q-factor;Optical fiber amplifiers;Technological innovation;5G mobile communication;Bit error rate;Bandwidth;Receivers;WDM;BER;OPM;EDFA;OFC},<br>(2) Dhakad, B., Ojha, S.S., Sharma, M. (2021). WDM Communication Network with Zero Bit Error Rate. In: Tomar, R.S., et al. Communication, Networks and Computing. CNC 2020. Communications in Computer and Information Science, vol 1502. Springer, Singapore. https://doi.org/10.1007/978-981-16-8896-6_2 |
| **References Books** | (1) J. Senior Optical Communication, Principle sand Practice Prentice Hall of India.<br>(2) J. Gower, Optical Communication System Prentice Hall of India. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/108/106/108106167/ |
| **Videos** | https://www.youtube.com/watch?v=ougKUUM3hJA |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | 1 |
| CO2 | - | 1 | 1 | - | - | 2 | - | - | - | 3 | - | - | - | 1 | - |
| CO3 | 1 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 1 |
| CO5 | 1 | 1 | - | 3 | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | VLSI Design |
| **Course Code** | ECL0826[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To learn basic techniques and fundamental concepts the basic theory of MOS transistors and Modeling of MOSFETs.**(BL1-Remember)**<br>**CO2-** To grasp the knowledge of common forms of physics involved in modeling of semiconductor device and designing the model of MOSFET devices.**(BL2-Understand)**<br>**CO3-** Apply the performance of CMOS Inverter circuits on the basis of their operation and working. Also Study the Static CMOS Logic Elements, Dynamic Logic Circuit Concepts and CMOS Dynamic Logic Families.**(BL3-Apply)**<br>**CO4-** To analyzed and evaluated the working and performance of digital and analog circuit and analyze Semiconductor Lasers, LEDs, modulators and other integrated devices. **(BL4-Analyze)**<br>**CO5-** To design various hardware oriented circuits and Layout of CMOS Integrated Circuits.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | CMOS LOGIC: Inverter, NAND Gate, Combinational Logic, NOR Gate, Compound Gates, Pass Transistors and Transmission Gates, Tristates, Multiplexers, Latches and Flip-Flops, CMOS Fabrication and Layout: Inverter Cross-section, Fabrication Process, Layout Design rules, Gate Layout, Stick Diagrams. VLSI Design Flow. Regularity, Modularity, Locality. | lecture method/Group Discussion | 9 |
| 2 | MOS TRANSISTOR THEORY: Ideal I-V Characteristics, C-V Characteristics: MOS Capacitance Models, MOS Gate Capacitance Model, MOS Diffusion Capacitance Model. Non ideal I-V Effects: Velocity Saturation and Mobility Degradation, Channel Length Modulation, Threshold Voltage Effects. DC Transfer characteristics: Static CMOS Inverter DC Characteristics, Beta Ratio Effects, Noise Margin, Ratioed Inverter Transfer Function, Pass Transistor DC Characteristics. | lecture method/Project based learning | 10 |
| 3 | DELAY AND POWER ESTIMATIONS: Delay Estimation: RC Delay Models. Linear Delay Model: Logical Effort, Parasitic Delay, Delay in a Logic gate. Logical Effort of Paths: Delay in Multistage Logic Networks, choosing the Best Number of Stages. Power Dissipation: Static Dissipation, Dynamic Dissipation | lecture method/Project based learning | 10 |
| 4 | COMBINATIONAL & SEQUENTIAL CIRCUIT DESIGNS: Combinational Circuit Design: Static CMOS, Ratioed Circuits, Cascode Voltage Switch Logic, Dynamic Circuits, Pass-Transistor Circuits. Sequential Circuit Design: Sequencing Static Circuits, Design of Latch and Flip-Flops: Static Latches and Registers, Dynamic Latches and Registers, Domino CMOS Logic. | lecture method/Project based learning | 11 |
| 5 | ARITHMETIC BUILDING BLOCKS AND MEMORY ARCHITECTURES: Data path circuits, Architectures for Adders, Accumulators, Multipliers, Barrel Shifters, Speed and Area Tradeoffs, Memory Architectures: RAM, ROM, Serial Access Memories. equations, Lossless lines, Distortion less line, Input impedance, Standing Wave Ratio and Power, The Smith chart, Some applications of transmission lines. | lecture method/Project based learning | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To design, circuit and layout a CMOS inverter and to calculate its leakage power, dynamic power, and average power using simulation | Experiments | BL5-Evaluate | 2 |
| 4 | To design, circuit and layout of two inputs, CMOS NOR Gate and to calculate its leakage power, dynamic power, and average power using simulation | Experiments | BL5-Evaluate | 2 |
| 5 | To design, circuit and layout of two inputs, CMOS NOR Gate and to calculate its leakage power, dynamic power, and average power using simulation | Experiments | BL4-Analyze | 2 |
| 6 | To design, circuit and layout of two inputs, CMOS XOR Gate and to calculate its leakage power, dynamic power, and average power using simulation | Experiments | BL4-Analyze | 2 |
| 7 | To design, circuit and layout of two inputs, CMOS XNOR Gate and to calculate its leakage power, dynamic power, and average power using simulation | Experiments | BL4-Analyze | 2 |
| 8 | To design, circuit and layout of two inputs, CMOS Half Adder and to calculate its leakage power, dynamic power, and average power using simulation | Experiments | BL6-Create | 2 |
| 9 | To Design the PBL of , CMOS Half Subtractor Using CMOS Transistor | PBL | BL6-Create | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Kang, S.M., & Leblebici, Y. (2003). CMOS Digital Integrated Circuits: Analysis & Design. Third Edition, Tata McGraw Hill Publishing Co. Ltd.<br>Weste, N. H., & Harris, D. M. (2011). CMOS Digital Integrated Circuits: Analysis & Design. Fourth Edition, Addison-Wesley Professional |
| **Articles** | https://ieeexplore.ieee.org/document/10503063 |
| **References Books** | Rabaey, J., & Chandrakasan, A., Nikolic, B. (2016). Digital Integrated Circuits: A Design Perspective. Second Edition, Prentice Hall of India<br>Wolf, W. (2002). Modern VLSI Design: System on Chip. Pearson |
| **MOOC Courses** | https://www.udemy.com/course/cmos-digital-vlsi-for-beginners/?couponCode=NVDPRODIN35<br>https://onlinecourses.nptel.ac.in/noc21_ee09/preview |
| **Videos** | https://ieeexplore.ieee.org/document/10527366 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO2 | - | 1 | 1 | - | - | 2 | - | - | - | 3 | - | - | - | - | - |
| CO3 | - | 1 | 1 | 3 | 2 | - | - | - | - | - | - | - | - | - | - |
| CO4 | 1 | 2 | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Web Technologies |
| **Course Code** | ECO0701B [T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To teach students the basics of server side scripting using PHP**(BL1-Remember)**<br>**CO2-** To explain web application development procedures**(BL2-Understand)**<br>**CO3-** To impart servlet technology for writing business logic**(BL3-Apply)**<br>**CO4-** . To facilitate students to connect to databases using JDBC**(BL4-Analyze)**<br>**CO5-** To evalute various concepts of application development using JSP**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to PHP: Declaring variables, data types, arrays, strings, operations, expressions, control structures, functions, Reading data from web form controls like Text Boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies. File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. Simple AJAX applications. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML Parsing XML Data - DOM and SAX parsers in java | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1) Web Technologies, Uttam K Roy, Oxford University Press<br>2) The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill |
| **Articles** | https://ieeexplore.ieee.org/document/1232045 |
| **References Books** | 1)Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech<br>2)Java Server Pages – Hans Bergsten, SPD O'Reilly |
| **MOOC Courses** | https://onlinecourses.swayam2.ac.in/nou24_cs09/preview |
| **Videos** | https://onlinecourses.swayam2.ac.in/nou24_cs09/preview |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | - | - |
| CO2 | 2 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | 3 | 3 | - | - |
| CO3 | 2 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | 3 | 3 | - | - |
| CO4 | 2 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | 3 | 3 | - | - |
| CO5 | 2 | 3 | 2 | 3 | 3 | - | - | - | - | - | - | 3 | 2 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Software Lab-I |
| **Course Code** | ECP0502[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Study of Circuit Simulation Software (any one-TINA-PRO/PSPICE/CIRCUIT MAKER/Multisim) Overview and use of software in design, optimization & simulation of Basic Electronic circuit and applications of software in the field of Electronics Engineering. | Lecture Method/ Video clips/ Simulation | 10 |
| II | Study of PCB Layout Software Overview and use of the software in optimization, designing and fabrication of PCB pertaining to above circuits simulated using above simulation software or other available software. | Lecture Method/ Video clips/ Simulation | 10 |
| III | Study of MATLAB Simulation Software Overview and use of the software with communication toolbox and block set. Students should simulate and design the at least two problems they are learning in the current semester. | Lecture Method/ Video clips/ Simulation | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To simulate and verify the V-I Characteristics of PN Junction Diode using Multisim | Simulation | BL4-Analyze | 2 |
| 2 | To simulate and verify the Drain Characteristics of N Channel Enhancement MOSFET in CS configuration using Multisim | Simulation | BL4-Analyze | 2 |
| 1 | To simulate and verify the Voltage Transfer Characteristics of BJT Inverter with resistive load using Multisim | Simulation | BL4-Analyze | 2 |
| 2 | To simulate and verify the Voltage Transfer Characteristics of MOS Inverter with Resistive Load using Multisim. | Simulation | BL4-Analyze | 2 |
| 2 | To simulate and verify the Voltage Transfer Characteristics of CMOS Inverter using Multisim | Simulation | BL4-Analyze | 2 |
| 1 | Transient Analysis of CMOS NAND gate using Multisim | Simulation | BL4-Analyze | 2 |
| 3 | Write a Matlab Code for Amplitude and Frequency Modulation. | Experiments | BL5-Evaluate | 2 |
| 2-3 | Design of practical Circuits and analysis using multisim | PBL | BL5-Evaluate | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Modern Communication Systems Using MATLAB 3rd Edition |
| **Articles** | Khaled M. Gharaibeh, "Communication System Models and Simulation in MATLAB®," in Nonlinear Distortion in Wireless Systems: Modeling and Simulation with MATLAB , IEEE, 2012, pp.175-220, doi: 10.1002/9781119961734.ch8. |
| **References Books** | https://in.mathworks.com/products/matlab-online.html<br>Problem-based learning in communication systems using MATLAB and Simulink |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_ma31/preview<br>https://www.multisim.com/ |
| **Videos** | https://in.mathworks.com/videos/mathworks-online-course-support-for-nptel-1701666901255.html |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 2 | 1 | - | - | - | - | - | - | 1 | 1 | - | 1 |
| CO2 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| CO3 | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - |
| CO4 | - | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - |
| CO5 | - | - | 3 | - | 1 | - | - | - | - | - | - | - | 1 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Software Lab-II |
| **Course Code** | ECP0603[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Write the Verilog Code & Simulate all basic Logic Gates. | Experiments | BL4-Analyze | 2 |
| 1 | Write the Verilog Code & simulate 4-bit Ripple Carry Adder. | Experiments | BL4-Analyze | 2 |
| 1 | Write the Verilog Code & simulate 4:1 Multiplexer & 1:4 De-multiplexer | Experiments | BL4-Analyze | 2 |
| 1 | Write the Verilog Code & simulate 3-8 line Decoder & 8:3 line Encoder | Experiments | BL4-Analyze | 2 |
| 2 | Write the Verilog Code & simulate JK, D and T Flip flops | Experiments | BL4-Analyze | 2 |
| 2 | Write the Verilog Code & simulate Ripple Up-Down Counter | Experiments | BL5-Evaluate | 2 |
| 1-2 | FPGA Circuit Design and simulation | PBL | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Verilog HDL: A Guide to Digital Design and Synthesis - Volume 1, Samir Palnitkar · 2003 |
| **Articles** | Tan, T. S., & Rosdi, B. A. (2014). Verilog hdl simulator technology: a survey. Journal of Electronic Testing, 30, 255-269. |
| **References Books** | Verilog by Example: A Concise Introduction for FPGA Design |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc19_cs72/preview<br>https://learning.intel.com/developer/learn/courses/235/verilog-hdl-basics |
| **Videos** | https://www.mathworks.com/academia/books/matlab-attaway.html |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 2 | - | 3 | - | - | - | - | - | - | - | 1 | - | 2 |
| CO2 | - | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | 2 | - | 1 | - | 2 | - | - | - | - | - | - | - | 2 | - | 1 |
| CO4 | 1 | 3 | - | 1 | - | - | - | - | - | - | - | - | - | 1 | - |
| CO5 | 2 | - | 3 | - | 2 | - | - | - | - | - | - | - | 1 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Evaluation of Industrial Training-III |
| **Course Code** | ECP0704[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Internships | | | | | | | |
| **Pre-Requisite/s** | Basic theoretical knowledge of electronics and communication. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Apply theoretical knowledge from coursework to solve real-world industry problems. (e.g., utilize marketing principles to develop a campaign for a local business)**(BL1-Remember)**<br>**CO2-** Demonstrate proficiency in industry-standard tools and technologies relevant to the internship field. (e.g., use design software to create graphics for a company website)**(BL2-Understand)**<br>**CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL3-Apply)**<br>**CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)**<br>**CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Learning of how to do team work, collaboration with others and learning of insight regarding the internal working atmosphere of companies. | Internships | BL2-Understand | 15 |
| 2 | Learning of how to use the theoretical knowledge for solving the industry problem. | Internships | BL3-Apply | 15 |
| 3 | Development of communication skill, managerial skill and exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. | Internships | BL4-Analyze | 15 |
| 4 | Adapting to evolving business cultures, new methods and technologies, services, technical interface. | Internships | BL4-Analyze | 15 |
| 5 | Learning of how to make industrial training reports and presentation of the reports and training. | Internships | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | - | - | - | - | - | - | 2 | - | - | - | - | 2 |
| CO2 | 1 | 2 | 3 | 3 | 2 | - | - | - | - | 2 | - | - | - | - | 3 |
| CO3 | 1 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 |
| CO4 | 1 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 2 |
| CO5 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Principles of Electrical Engineering |
| **Course Code** | EEL0201[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Predict the behavior of any electrical circuits, Formulate and solve complex DC circuits.**(BL1-Remember)**<br>**CO2-** Predict the behavior of any electrical circuits, Formulate and solve complex single phase AC circuits.**(BL2-Understand)**<br>**CO3-** Predict the behavior of any electrical circuits, Formulate and solve complex Three phase AC circuits.**(BL3-Apply)**<br>**CO4-** Identify the type of electrical machine used for that particular application. Realize the requirement of transformers in transmission and distribution of electric power and other applications.**(BL4-Analyze)**<br>**CO5-** Predict the behavior of various measuring instruments in electrical engineering**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | D.C. Circuit: - Combination of resistance in series & parallel, their solution ,Star –Delta combination, KCL and KVL. Voltage and current sources, dependent and independent sources, source conversion, DC circuit's analysis using mesh & nodal method, Superposition theorem. | Talks and presentations | 12 |
| 2 | Single Phase Circuit:- Generation of Alternating Voltage & Currents, Their Equation, Definition, R.M.S and Average values, Vector representation of alternating quantities, Phasor relations between voltage & current in each of resistance, inductance and capacitance, A.C series circuit power & power factor , Resonance in series circuit. | Talks and presentations | 11 |
| 3 | Electrical Measuring Instruments:-Introduction and classification of Electrical Instruments, Essentials of indicating instruments, Moving iron instruments, Types ofmoving iron instruments, Advantages and Disadvantages of moving iron instruments, Applications of moving iron equipment, Permanente Magnet type moving coil instruments, extension of range of ammeters and voltmeter, Dynamometer type instruments, Dynamometer type wattmeters | Talks and presentations | 13 |
| 4 | Poly-phase Circuits:-Generation of Poly-phase Voltages, 3phase system, Phase sequence, Inter connection of 3 phases, Voltage, Currents & Power relationships in balanced 3 phase circuits, Power Measurement in single phase & 3 phase circuits.. | Talks and presentations | 11 |
| 5 | Transformer:- Construction & working principle of transformer, Emf equation, No load & Full load phasor diagram , Equivalent circuit, Losses & Efficiency, Voltage Regulation, Open circuit & Short Circuit Test on the Transformer | Talks and presentations | 13 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To verify Kirchoff's current law and voltage law | Experiments | BL2-Understand | 2 |
| 1 | To verify superposition theorem | Experiments | BL3-Apply | 2 |
| 2 | Measurement Of Active & Reactive power in Single Phase AC circuit and three phase ac circuit | Experiments | BL2-Understand | 2 |
| 2 | Measurement of Impedance of R-L, R-C, R-L-C & study of resonance phenomena | Experiments | BL2-Understand | 2 |
| 2 | Measurement Of Power & Power factor in a Single Phase AC Circuit using Three Ammeter Method | Experiments | BL3-Apply | 2 |
| 4 | Measurement of line quantities and phase quantities in a three phase ac circuit | Experiments | BL4-Analyze | 2 |
| 5 | Study of transformer name plate rating and determination of its transformation ratio | Experiments | | 2 |
| 5 | To perform load test on a single-phase transformer | Experiments | BL2-Understand | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition |
| **Articles** | |
| **References Books** | Basic Electrical Engg, Sunil S Gaikwad, Dream Tech/ Willey Publication. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 1 | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 | 2 |
| CO2 | 1 | 1 | 2 | 1 | 1 | 1 | - | 1 | - | - | 1 | 1 | 2 | 3 | 1 |
| CO3 | 2 | 1 | 2 | 1 | 2 | - | 1 | - | - | - | 1 | 1 | 1 | 2 | 2 |
| CO4 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | 1 | 1 | 3 | 1 | 3 |
| CO5 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | 1 | - | 2 | 2 | 1 |
| CO6 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 1 | 3 | 2 |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Communication Skills & Colloquium |
| **Course Code** | HUL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Student must have knowledge about Language proficiency. | | | **Co-Requisite/s** | 1.Developed Communication skills. 2.Career Development workshop | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Comprehend and summarize characteristics & various structural principlesprerequisite to Technical Communication ((**BL1-Remember)**<br>**CO2-** Classify and formulate the elementary intricacies of Scientific and Technical Writing using application grammar construct.**(BL2-Understand)**<br>**CO3-** Create cohesive technical paragraphs & text.**(BL3-Apply)**<br>**CO4-** Paraphrase text(s) and use appropriate referencing styles**(BL4-Analyze)**<br>**CO5-** Evaluate the significance of Formal Writing**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Module-1 | Introduction to Communication Skills, Objectives, Significance of Communication, Flow of Communication, Principles Communication, Essential Features, Process of Communication, Verbal (Oral & Written) and Non-verbal Communication, Barriers to Effective Communication, Introduction to Technical Communication, Major Difference between Technical Communication and General Communication. | Audio/Video clips, group discussion, Lecture Method | 6 |
| Module-2 | Introduction & Significance of Listening skills, Types of Listening, Barriers in Effective Listening, Basic Grammar - Parts of Speech, Active Passive and Articles. | Audio/Video clips, group discussion, Lecture Method | 6 |
| Module-3 | Introduction to Formal Letter Writing, Elements of Letter Writing and Style of Writing, Layout & Structure of Formal Letter Writing, Introduction to the Types of Business Letters- Enquiry, Calling Quotations, Order,Complaint and Adiustment.Introduction to Employment Communication- Job Application, Writing Resume, Differences among Resume, Curriculum Vitae & Bio-data. | Audio/Video clips, group discussion, Lecture Method | 6 |
| Module-4 | Introduction to Oral Presentations, Objectives, Significance and Approach, Preparation and Delivery of Oral Presentation (topics to be selected by the teachers). Introduction to Interview Skills. How to Develop Interview Skills. Dos and Don't of Interviews, Types of Interviews, Reviewing TV Program/Book/News Paper Articles etc. | Audio/Video clips, group discussion, Lecture Method | 6 |
| Module-5 | Introduction to Report Writing, Major Objectives of Writing Reports, Significance of Business/Technical, Types and Forms of Reports, Styles of Writing Reports- Printed Format, Memo Format, Letter Format, Book/Letter Text Format. Layout and Structure of Reports, Components of Reports, Writing | Audio/Video clips, group discussion, Lecture Method | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Unit 1 | Soft Skills | PBL | BL2-Understand | 6 |
| Unit 2 | Basics of Communication | PBL | BL3-Apply | 6 |
| Unit 3 | Letter Writing | PBL | BL3-Apply | 6 |
| Unit 4 | Active Passive | PBL | BL4-Analyze | 6 |
| Unit 5 | Rport Writing | PBL | BL5-Evaluate | 6 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1. Essentials of Business Communication with Student CD-ROM by Mary Ellen Guffey, Paperback: SII pages, Publisher: South-Western Educational 2. Business Communication: Building Critical Skills by Kitty O. Locker, Stephen Kyo Kazmarek, Hardcover: 637 pages, Publisher: Irvin/McGraw-Hill |
| **Articles** | https://www.jetir.org/papers/JETIR2108373.pdf https://open.lib.umn.edu/communication/chapter/1-2-the-communication-process/ https://www.iosrjournals.org/iosr-jbm/papers/Vol22-issue8/Series-2/E2208024254.pdf |
| **References Books** | 1. Business Communication Today by Courtland L. Bovee, John V. Thill, Barbara E. Schatzman, Hardcover: 730 pages, Publisher: Prentice Hall. 2. Excellence In Business Communication (6th Edition) by John Thill, Courtland L. Bovee, Paperback: 656 pages, Publisher: Prentice Hall. |
| **MOOC Courses** | http://www.digimat.in/nptel/courses/video/109104031/L01.html |
| **Videos** | http://www.digimat.in/nptel/courses/video/109104031/L01.html |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | 2 | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 2 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | 2 | - | - | 3 | 2 | 3 |
| CO4 | 3 | 2 | - | 2 | 1 | - | - | - | - | 2 | - | - | 2 | 3 | 3 |
| CO5 | 3 | 2 | - | 2 | 1 | - | - | - | - | 2 | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Engineering Mechanics |
| **Course Code** | MEL0101[T] |

Part A

| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 Remember the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions**(BL1-Remember)**<br>**CO2-** CO2 Understand the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions **(BL2-Understand)**<br>**CO3-** CO3 Apply system of forces in the belts drive systems as power transmission devices, shafts and beams.**(BL3-Apply)**<br>**CO4-** CO4 Analyze the beams and trusses with centre of mass and moment of inertia.**(BL4-Analyze)**<br>**CO5-** CO5 Evaluate shear force and bending moment in designing of shafts and beams and trusses.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction of Engineering Mechanics Basic concepts of system of forces- Coplanar Concurrent Forces - Components in Space – Resultant Moment of Forces and its Application - Couples and Resultant of Force System - Equilibrium of System of Forces- Free body diagrams- Equations of Equilibrium of Coplanar Systems and Spatial Systems. | Lectures Method, Group discussion | 9 |
| Unit-2 | Friction Types of friction, Limiting friction, Laws of Friction, static and Dynamic Friction. Motion of Bodies - Wedge, Ladder and Screw jack. | Lectures Method, Group discussion | 7 |
| Unit-3 | Transmission of Power Belt Drivers - Open, Crossed and compound belt drives, length of belt, tensions- tight side and slack side, Power transmitted and condition for maximum power. | Lectures Method, Group discussion | 7 |
| Unit-4 | Center of Gravity & Moment of Inertia: Centroids - Centroids of Composite figures - Centre of Gravity of Bodies - Area moment of Inertia: - polar Moment of Inertia - Transfer - Theorems - Moments of Inertia of Composite Figures, Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia.. | Lectures Method, Group discussion | 8 |
| Unit-5 | Shear Force & Bending Moment Diagrams & Trusses: Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple. Application of Equilibrium Concepts. Trusses- types, method of joints and method of moments. | Lectures Method, Group discussion | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | 1. To verify the law of Triangle of forces and Lami's theorem. | Experiments | BL3-Apply | 2 |
| Experiment-2 | 2. To verify the law of parallelogram of forces | Experiments | BL3-Apply | 2 |
| Experiment-3 | 3. To verify law of polygon of forces | Experiments | BL3-Apply | 2 |
| Experiment-4 | 4. To find the support reactions of a given truss and verify analytically. | Experiments | BL3-Apply | 2 |
| Experiment-5 | 5. To determine support reaction and shear force at a given section of a simply supported beam and verify in analytically using parallel beam apparatus. | Experiments | BL3-Apply | 2 |
| Experiment-6 | 6. To verify bending moment at a given section of a simply supported beam. | Experiments | BL3-Apply | 2 |
| Experiment-7 | 7. To find coefficient of friction on horizontal and inclined planes. | Experiments | BL3-Apply | 2 |
| Experiment-8 | 8. To determine centre of gravity of different shapes. | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Engineering Mechanics by Dr. D.S. Kumar, S.K. Kataria & sons, latest edition. Engineering Mechanics by R. K. Rajput, S.Chand & Co. Engineering Mechanics: Statics & Dynamics by R.C. Hibbler |
| **Articles** | |
| **References Books** | • Engineering Mechanics- statics dynamics by Boresi & Schmidt, Thomson Books • Engineering Mechanics - Schaum's series - Mc.Grawhill Publications. • Engineering Mechanics by S. Timashenko, D.H. Young and J.V. Rao |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106286/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | - | 1 | 3 | - | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | - | 1 | 2 | 1 | 1 | 1 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BTech-Electronics_and_Communication**

| | |
|---|---|
| **Title of the Course** | Engineering Graphics |
| **Course Code** | MEL0202[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of geometrical construction, sketching, imagination etc. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To get the fundamentals of engineering graphics, geometrical construction and its applications.**(BL1-Remember)**<br>**CO2-** To understand the basic concept of engineering graphics through real-life examples. **(BL2-Understand)**<br>**CO3-** To implement the different engineering graphics concepts over appropriate drawing dataset. **(BL3-Apply)**<br>**CO4-** To analyze the drawing performance of engineering graphics techniques.**(BL4-Analyze)**<br>**CO5-** To evaluate the drawing performance of engineering graphics techniques on a corresponding object.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | 1. Drafting tools, 2. Principles of Graphics, 3. Geometrical constructions 4. Scales: Plain, diagonal, 5. Curves used in engineering practice: such as ellipse, parabola, hyperbola by different methods. Cycloidal curves, Involutes and Spirals. | Lecture Method/Video | 8 |
| Unit-2 | 1, Types of projection, Orthographic projections, First angle and third angle projection. 2. Projections of points in different quadrants. Projections of lines, True inclination and true length of straight line, Traces. | Lecture Method | 8 |
| Unit-3 | Projections of planes: Perpendicular plane, oblique plane and Auxiliary plane, projection of planes with inclined to one or both the reference planes and traces of planes. | Lecture Method | 8 |
| Unit-4 | 1. Projection of solids: Polyhedron and solids of revolution, projection of solids with inclined to one or both the reference planes. 2. Introduction to Section of solids and Development of surfaces. | Lecture Method | 8 |
| Unit-5 | 1. Isometric projection: Isometric scale, isometric projections from orthographic drawing. 2. Computer Aided Drafting (CAD): Introduction, benefit, software's, basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD. | Lecture Method | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Drawing sheet of plane scale. | Experiments | BL3-Apply | 2 |
| Experiment -2 | Drawing sheet of diagonal scale. | PBL | BL3-Apply | 2 |
| Experiment -3 | Drawing sheet of ellipse. | PBL | BL3-Apply | 2 |
| Experiment -4 | Drawing sheet parabola and hyperbola | PBL | BL3-Apply | 2 |
| Experiment -5 | Drawing sheet of cycloidal curves. | PBL | BL3-Apply | 2 |
| Experiment -6 | Drawing sheet of orthographic projection | | BL3-Apply | 2 |
| Experiment -7 | Drawing sheet of projection of line | | BL3-Apply | 2 |
| Experiment -8 | Drawing sheet of projection of plane. | | BL2-Understand | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1. N.D.Bhatt Elementary of Enginnering Drawing Charotar Publication<br>P.S. Gill Engineering Drawing Kataria Publication<br>Agrawal and Agrawal Engineering Drawing TMH |
| **Articles** | |
| **References Books** | Venu Gopal K Engineering Drawing New age<br>K.L. Narayana& P. Kannaiah Engineering Drawing SCITECH Pub. |
| **MOOC Courses** | https://nptel.ac.in/courses/112103019 |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 2 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | - | - | 2 | 1 | 1 | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Essentials of Information Technology |
| **Course Code** | CSL0201 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 2 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Basics of Computer system, Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the basics of Computer systems like types, I/O devices, storage of computer systems (Knowledge, Understand)**(BL1-Remember)**<br>**CO2-** Apply the various networking concepts, topologies and remove deadlocks. (Apply).**(BL2-Understand)**<br>**CO3-** Explain various memory management techniques and Analyze the concept of Sub-programs and blocks (Analysis)**(BL3-Apply)**<br>**CO4-** Design the concept of software, operating system for better utilization of external system (Design)**(BL4-Analyze)**<br>**CO5-** Evaluating the various algorithm, its solution and other communication techniques. (Investigation).**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Computer Basics: Basics of Computer Systems(T1,T2), Evolution of Computers, Computer Generations, Classification of Computers(T1,T3), Computer Applications, Interaction between User and Computer(T7). Hardware Components, Basic Computer Organization, Input and Output Devices(T1,T3), Central Processing Unit(T1), System Bus Architecture, Memory or Storage Unit | White Board, PPT | 6 |
| 2 | Operating System: Introduction to Operating System, Function of Operating Systems(T1), Working Knowledge of GUI-Based Operating System (T3,T4), Working with latest version of Windows(T3,T4). Various Operating Systems, Evaluation of Operating System(T3,T4,T,7), Virtual Machine, Operating Systems for Mobile, Installation of Operating System(T1,T3,T4), Boot Process. | White Board, PPT | 6 |
| 3 | Computer Networks and World Wide Web: Introduction to Computer Networks (LAN, MAN, WAN, PAN)(T3,T4), Network Topologies, Ethical Issues related to Network Security(T2,T3). Internet and World Wide Web(T7,T8), Internet Evolution(T1), FTP, Electronic Mail, Search Engines(T1), Introduction to HTML, Static and Dynamic Web Pages | White Board, PPT | 6 |
| 4 | Computer Software: Introduction, System Software(T1,T3), Application Software, Firmware(T3), Software Installing and Uninstalling(T3,T4), Software Development Steps, Characteristics of good software(T1,T7), Usability of software, Introduction to Free and Open Source Software(T3,T4), Introduction to Database Management System | White Board, PPT | 6 |
| 5 | Subprograms and Blocks: Problem Solving: Flow Charts(T3,T4), Tracing Flow Chart, Algorithms. Fundamentals of sub-programs(T1,T3,T4), Scope of life time of variables, static and dynamic scope(T7), design issues of subprograms and operations, parameter passing methods(T3,T4), overloaded sub-programs, generic sub-programs(T1,T3), design issues for functions user defined overloaded operators | White Board, PPT | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Explain the Installation process of Operating system and its Memory Management. | Experiments | BL2-Understand | 10 |
| 2-3 | Design of a Web Page which describe your Biodata. | PBL | BL3-Apply | 10 |
| 4-5 | Describe Software development life cycle (SDLC) with all components. | PBL | BL5-Evaluate | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | P. K. Sinha, Priti Sinha; Computer Fundamentals; BPB Publication. V. Rajaraman; Fundamentals of Computers; Prentice Hall of India Publication. G. G. Wilkinson; Fundamentals of Information Technology; Wiley-Blackwell Publishing. Yashwant P. Kanetkar; Let Us C; BPB Publication. |
| **Articles** | |
| **References Books** | E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. Ron Mansfield; Working in MS-Office; Tata McGraw Hill Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | - | - | 1 | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | - | - | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Object Oriented Programming by Java |
| **Course Code** | CSP0303 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 4 | 4 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic principles of the object-oriented programming **(BL1-Remember)**<br>**CO2-** Understand the basic concept of the object-oriented programming **(BL2-Understand)**<br>**CO3-** Apply the logic of oops in java **(BL3-Apply)**<br>**CO4-** Able to Analyze inheritance and abstraction **(BL4-Analyze)**<br>**CO5-** Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Objects and Classes: Introduction of Eclipse software ,Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 2 | Inheritance: Inheritance in java, Super and sub class, Overriding, Object class,. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 3 | Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package. | Lecture Method/ Case Study/ Video/ Group Discussion | 12 |
| 4 | Abstract class, Interface in java, Package in java, UTIL package., encapsulated | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |
| 5 | I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files | Lecture Method/ Case Study/ Video/ Group Discussion | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Program to define a structure of a basic JAVA program | Experiments | BL4-Analyze | 2 |
| 2 | Program to define student class with user input | Experiments | BL4-Analyze | 2 |
| 3 | Program to define student class without user input | Experiments | BL4-Analyze | 2 |
| 4 | Program to define class and constructors | Experiments | BL4-Analyze | 2 |
| 5 | Program to define class, methods and objects. Demonstrate method overloading. | Experiments | BL4-Analyze | 2 |
| 6 | Program to define inheritance and show method overriding. | Experiments | BL4-Analyze | 2 |
| 7 | Program to define inheritance with .superclass | Experiments | BL4-Analyze | 2 |
| 8 | Program to define abstraction | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | 1) Daniel Liang, Seventh Edition, Pearson, introduction to Java Programming(Comprehensive Version) Seventh Edition, Pearson. |
| **Articles** | https://www.irjet.net/archives/V7/i10/IRJET-V7I10247.pdf |
| **References Books** | 1) Sachin Malhotra & Saurabh Chaudhary, Programming in Java Oxford University Press. |
| **MOOC Courses** | https://www.coursera.org/courses?query=object%20oriented%20programming |
| **Videos** | https://archive.nptel.ac.in/courses/106/105/106105153/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | 1 | - | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO4 | 2 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 1 | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Computer Programming (PYTHON) |
| **Course Code** | CSP0405 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember the syntax and semantics of Python Programming Language **(BL1-Remember)**<br>**CO2-** Understand the Basic concept of Python Programming **(BL2-Understand)**<br>**CO3-** Apply the concept of Python in ML **(BL3-Apply)**<br>**CO4-** Analysis the use of built-in functions to navigate the file system**(BL4-Analyze)**<br>**CO5-** Implement and evaluate the Python code in project **(BL5-Evaluate)**<br>**CO6-** Appraise the need for working on web scraping **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Python Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Python IDE, Introduction to anaconda, python variable declaration, Keywords, Indents in Python, Python input/output operations | Lectures with whiteboard/PPT, Recorded video/interactive videos | 5 |
| 2 | Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 5 |
| 3 | Conditional Statements (If, If-else, If-elif-else, Nested-if etc.) and loop control statements (for, while, Nested loops, Break, Continue, Pass statements | Lectures with whiteboard/PPT, Recorded video/interactive videos | 5 |
| 4 | Introduction to functions, Function definition and calling, Function parameters, Default argument function, Variable argument function, in built functions in python, Scope of variable in python | Lectures with whiteboard/PPT, Recorded video/interactive videos | 5 |
| 5 | Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file, some important File handling functions e.g open(), close(), read(), readline() etc. Modules Concept of modularization, Importance of modules in python, Importing modules, Built in modules ( ex: Numpy) | Lectures with whiteboard/PPT, Recorded video/interactive videos | 5 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Write a program to add two numbers in python | Experiments | BL5-Evaluate | 2 |
| 1 | Write a Program by using if statement in python | Experiments | BL5-Evaluate | 2 |
| 2 | Write a Program by using while loop in python | Experiments | BL5-Evaluate | 2 |
| 2 | Write a Program by using for loop in python | Experiments | BL5-Evaluate | 2 |
| 3 | Write a program to find whether a number is even or odd | Experiments | BL5-Evaluate | 2 |
| 3 | Write a program to find LCM of a number in python | Experiments | BL5-Evaluate | 2 |
| 4 | Write a Program to print all the prime numbers in an interval | Experiments | BL5-Evaluate | 2 |
| 4 | Write a Program for a simple calculator | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 40 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | Mark Lutz Learn python 5th addition |
| **Articles** | |
| **References Books** | John M Zelle , Python Programming, Ingram short title |
| **MOOC Courses** | |
| **Videos** | https://onlinecourses.swayam2.ac.in/cec22_cs20/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Programming Logics |
| **Course Code** | CST0201 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Windows/Linux operating system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember: Recall the syntax and basic concepts of C programming.**(BL1-Remember)**<br>**CO2-** Understand: Explain the meaning of C programming constructs and how they work together**(BL2-Understand)**<br>**CO3-** Apply : Apply the various conditional and looping statement and functional programming.**(BL3-Apply)**<br>**CO4-** Analyzing: Analyze and evaluate C programming code to identify errors and optimize performance.**(BL4-Analyze)**<br>**CO5-** Evaluate : Evaluate the effectiveness of C programming solutions and propose improvements.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Character set, variables and identifiers, built-in data types, arithmetic operators and expressions, constants and literals, simple assignment statements, basic input/output statements, simple 'C' programs. | Demonstration throughPPT, Computer | 10 |
| 2 | Conditional Statements and Loops: Decision making within a program, conditions, relational operators, logical connectives, if statement, if-else statement; Loops: while loop, do-while loop, for loop; nested loops, infinite loops; switch statement, structured programming. Array: One Dimensional Arrays - array manipulation, searching, insertion and deletion in an array; Two Dimensional Arrays - addition/multiplication of two matrices, transpose of a square matrix; string | Demonstration throughPPT, Computer | 10 |
| 3 | Pointer: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays, dynamic memory allocation. Functions: Standard library functions, prototype of a function, return type, function calling, block structure, passing arguments to a function - call by reference and call by value; recursive functions, arrays as function arguments. | Demonstration throughPPT, Computer | 10 |
| 4 | Structure and Union: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays - arrays of structure, structures containing arrays, unions. Dynamic Memory Management: Use of malloc, calloc, realloc and free keywords | Demonstration throughPPT, Computer | 10 |
| 5 | File Management: Introduction, defining and opening a file, closing a file, input/output operations on files, error handling during i/o operations, random access to files, programs using files. Command Line Arguments: argv and argc arguments, programs using command line arguments. Preprocessor: Introduction, macro substitution, file inclusion, compiler control directives. | Demonstration throughPPT, Computer | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Life Insurance Premium Calculator | Experiments | BL3-Apply | 10 |
| 2-3 | Program to compare best life insurance plan using an array. | PBL | BL4-Analyze | 10 |
| 4-5 | Write a C program to read name and marks of n number of students from user and store them in a file. If the file previously exits, add the information of n students. | PBL | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 40 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | B. W. Kernighan, Dennis M. Ritchi; The C Programming Language; Prentice Hall. |
| **Articles** | |
| **References Books** | Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. |
| **MOOC Courses** | https://www.my-mooc.com/ja/mooc/logic-and-computational-thinking/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | - | 3 |
| CO3 | 2 | - | 1 | - | - | 2 | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Basic Electronics |
| **Course Code** | ECL0101[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of modern physics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To become familiar with various types of semiconductors and basic electronic devices.**(BL1-Remember)**<br>**CO2-** To understand the operation of various electronic devices.**(BL2-Understand)**<br>**CO3-** To implement the concepts of semiconductors to various semiconductor devices.**(BL3-Apply)**<br>**CO4-** To analyze the various electronic devices and their frequency response.**(BL4-Analyze)**<br>**CO5-** To evaluate the performance of electronic devices such as diodes, transistors, function generators, and cathode ray oscilloscopes.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Semiconductor Basics: Intrinsic and Extrinsic Semiconductors, Current Mechanisms in Semiconductors: Drift and Diffusion Current. PN Junction: Formation of PN Junction, Creation of Depletion Layer, Forward and Reverse Biasing, Diode Current Equation, Volt – Ampere characteristics of PN junction diode and effect of temperature on V-I characteristics, Diode resistances, Diode Capacitances, Diode Equivalent circuits: Piecewise Linear approximation Model, Simplified approximation Model, Ideal equivalent circuit. | Whiteboard/PPT/Video | 12 |
| II | Diode Applications: Diode as Rectifier: Half Wave rectifier, Full Wave Rectifier, Calculation of Average, RMS loads voltages and currents, Rectification efficiency, PIV, Ripple factor. Break Down Diodes: Avalanche and Zener Breakdown. V-I characteristics of Zener Diode, Zener Diode Specifications, Zener Diode Equivalent Circuit. Zener Diode as Shunt Regulator: Analysis of Zener diode as shunt regulator under varying Load capacitance and Supply voltage. | PPTs/White Board | 10 |
| III | Bipolar Junction Transistor: Formation of NPN and PNP Transistor, unbiased and biased transistor, Transistor currents, Symbol of NPN and PNP Transistors, Common Base, Common Emitter and Common Collector Configurations along with Input and Output Characteristics, Transistor Amplifying action. Transistor Biasing: Load Line, Operating Point, Need of Biasing, Different Biasing Techniques: Fixed Bias, Emitter Stabilized Bias, Voltage Divider Bias, DC Bias with Voltage Feedback | PPTs/White Board/video | 10 |
| IV | Field Effect Transistor: JFET: Construction of N channel and P channel JFET, Working of JFET along with Drain and Transfer Curves, JFET Parameters and symbol, JFET Biasing. MOSFET: Construction and working of N channel and P channel Depletion and Enhancement MOSFETs, Drain and Transfer curves, Symbols. Operational Amplifier: Basics of operation amplifier, op-amp parameters: Input offset voltage, Output offset voltage, Slew rate, CMRR etc. Open and closed loop gain, Virtual Ground, Characteristic of ideal operational amplifier. Operational Amplifier Applications: Use of Ideal Op-amp to construct: Inverting amplifier, Non-inverting amplifier, Differentiator, Integrator, Adder, Subtractor etc. | Whiteboard/PPT | 12 |
| V | Electronic Instruments: Digital Voltmeter, Digital Multimeter, Cathode Ray Oscilloscope, Applications of CRO: Measurement of Voltage, Current, Time Period, Frequency, Use of Lissajous Pattern to Measure unknown frequency and phase difference, Function Generator. | PPT/White board | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to Laboratory Equipment's: Cathode Ray Oscilloscope (CRO), Function Generator, Digital Multimeter. | Experiments | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | Boylestad & Nashelsky Electronics Devices and Circuit Theory Pearson Education India, 2009.<br>Ramakant A. Gayakwad Op Amps and Linear Integrated Circuits Englewood Cliffs: Prentice-Hall, 2012. |
| **Articles** | |
| **References Books** | Malvino, L. Electronic principles The McGraw Hill Companies, 2016.<br>Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press 2017<br>Graham Bell Electronic Devices and Circuits Prentice-Hall 2009 |
| **MOOC Courses** | https://nptel.ac.in/courses/122106025 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | - | 2 | 2 | 1 |
| CO2 | 1 | 2 | 1 | 1 | 1 | 1 | - | - | - | 1 | - | - | 2 | 2 | 2 |
| CO3 | 1 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | - | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | - | 3 | 3 | 2 |
| CO5 | 1 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | - | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Basic Electronics |
| **Course Code** | ECL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of modern physics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To become familiar with various types of semiconductors and basic electronic devices.**(BL1-Remember)**<br>**CO2-** To understand the operation of various electronic devices.**(BL2-Understand)**<br>**CO3-** To implement the concepts of semiconductors to various semiconductor devices.**(BL3-Apply)**<br>**CO4-** To analyze the various electronic devices and their frequency response.**(BL4-Analyze)**<br>**CO5-** To evaluate the performance of electronic devices such as diodes, transistors, function generators, and cathode ray oscilloscopes.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Semiconductor Basics: Intrinsic and Extrinsic Semiconductors, Current Mechanisms in Semiconductors: Drift and Diffusion Current. PN Junction: Formation of PN Junction, Creation of Depletion Layer, Forward and Reverse Biasing, Diode Current Equation, Volt – Ampere characteristics of PN junction diode and effect of temperature on V-I characteristics, Diode resistances, Diode Capacitances, Diode Equivalent circuits: Piecewise Linear approximation Model, Simplified approximation Model, Ideal equivalent circuit. | Whiteboard/PPT/Video | 12 |
| II | Diode Applications: Diode as Rectifier: Half Wave rectifier, Full Wave Rectifier, Calculation of Average, RMS loads voltages and currents, Rectification efficiency, PIV, Ripple factor. Break Down Diodes: Avalanche and Zener Breakdown. V-I characteristics of Zener Diode, Zener Diode Specifications, Zener Diode Equivalent Circuit. Zener Diode as Shunt Regulator: Analysis of Zener diode as shunt regulator under varying Load capacitance and Supply voltage. | PPTs/White Board | 10 |
| III | Bipolar Junction Transistor: Formation of NPN and PNP Transistor, unbiased and biased transistor, Transistor currents, Symbol of NPN and PNP Transistors, Common Base, Common Emitter and Common Collector Configurations along with Input and Output Characteristics, Transistor Amplifying action. Transistor Biasing: Load Line, Operating Point, Need of Biasing, Different Biasing Techniques: Fixed Bias, Emitter Stabilized Bias, Voltage Divider Bias, DC Bias with Voltage Feedback | PPTs/White Board/video | 10 |
| IV | Field Effect Transistor: JFET: Construction of N channel and P channel JFET, Working of JFET along with Drain and Transfer Curves, JFET Parameters and symbol, JFET Biasing. MOSFET: Construction and working of N channel and P channel Depletion and Enhancement MOSFETs, Drain and Transfer curves, Symbols. Operational Amplifier: Basics of operation amplifier, op-amp parameters: Input offset voltage, Output offset voltage, Slew rate, CMRR etc. Open and closed loop gain, Virtual Ground, Characteristic of ideal operational amplifier. Operational Amplifier Applications: Use of Ideal Op-amp to construct: Inverting amplifier, Non-inverting amplifier, Differentiator, Integrator, Adder, Subtractor etc. | Whiteboard/PPT | 12 |
| V | Electronic Instruments: Digital Voltmeter, Digital Multimeter, Cathode Ray Oscilloscope, Applications of CRO: Measurement of Voltage, Current, Time Period, Frequency, Use of Lissajous Pattern to Measure unknown frequency and phase difference, Function Generator. | PPT/White board | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to Laboratory Equipment's: Cathode Ray Oscilloscope (CRO), Function Generator, Digital Multimeter. | Experiments | BL2-Understand | 2 |
| 5 | Measurement of Amplitude, Time Period & Frequency of a Signal using CRO. | Experiments | BL4-Analyze | 2 |
| 2 | To study and plot the V-I characteristics of PN Junction Diode. | Experiments | BL4-Analyze | 2 |
| 3 | To study Full Wave Centre Tap Rectifier and calculate various parameters. | Experiments | BL4-Analyze | 2 |
| 1 | To study and plot the V-I characteristics of PN Junction Diode. | Experiments | BL4-Analyze | 2 |
| 4 | To study Full Wave Bridge Rectifier and calculate various parameters | Experiments | BL4-Analyze | 2 |
| 3 | To study and plot Input & Output Characteristics of BJT in Common Base Configuration | Experiments | BL5-Evaluate | 2 |
| 4 | To study and plot Input & Output Characteristics of BJT in Common Emitter Configuration | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 100 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | Boylestad & Nashelsky Electronics Devices and Circuit Theory Pearson Education India, 2009.<br>Ramakant A. Gayakwad Op Amps and Linear Integrated Circuits Englewood Cliffs: Prentice-Hall, 2012. |
| **Articles** | |
| **References Books** | Malvino, L. Electronic principles The McGraw Hill Companies, 2016.<br>Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press 2017<br>Graham Bell Electronic Devices and Circuits Prentice-Hall 2009 |
| **MOOC Courses** | https://nptel.ac.in/courses/122106025 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 1 | - | - | - | - | 1 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | 1 | - | - | 2 | 2 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | - | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | - | - | 3 | 3 | 2 |
| CO5 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | - | - | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Mini Project |
| **Course Code** | EED 0603 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 4 | 4 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Examine and cultivate a cognitive approach for delivering a presentation.**(BL2-Understand)**<br>**CO2-** Enhance his linguistic and communicative abilities. **(BL3-Apply)**<br>**CO3-** romote collaboration by cultivating an understanding of alternative perspectives.**(BL4-Analyze)**<br>**CO4-** Stay updated on the most recent advancements in electrical engineering.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Major project-I |
| **Course Code** | EED0704 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Utilize contemporary tool sets to simulate and verify utilizing experimental methods whenever possible.**(BL3-Apply)**<br>**CO2-** . Verify and examine the outcomes by utilizing various case studies.**(BL4-Analyze)**<br>**CO3-** Make logical deductions and draw significant conclusions that are suitable for publication.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Major Project |
| **Course Code** | EED0804 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 8 | 8 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Utilize contemporary tool sets to simulate and verify utilizing experimental methods whenever possible. **(BL3-Apply)**<br>**CO2-** Verify and examine the outcomes by utilizing various case studies. **(BL5-Evaluate)**<br>**CO3-** Make logical deductions and draw significant conclusions that are suitable for publication.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Home Automation System | PBL | BL6-Create | 120 |
| 2 | Arduino Radar Model | PBL | BL6-Create | 120 |
| 3 | DC motor speed control wireless | PBL | BL6-Create | 120 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO3 | 1 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Machine-II |
| **Course Code** | EEL 0507 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge about generalized principles of rotating machines | | | **Co-Requisite/s** | Basic connection knowledge | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various aspects of Electrical Machines.**(BL1-Remember)**<br>**CO2-** To understand Static and rotating machines.**(BL2-Understand)**<br>**CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)**<br>**CO4-** To analyze the different numeric problems for well understand subjects problems.**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the data using statistical & visualization tools.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Three phase Induction Machine – I Constructional features, Rotating magnetic field, Principle of operation, Phasor diagram, equivalent circuit, torque and power equations, Torque- slip characteristics, No load & blocked rotor tests,, efficiency, Induction generator & its applications. | Talks and presentations | 12 |
| Unit-2 | Three phase Induction Machine- II Starting, Deep bar and double cage rotors, Cogging & Crawling, Speed Control (with and without emf injection in rotor circuit.). Speed control of induction motors: Variation of supply voltage, rotor resistance control, cascading, slip power recovery scheme, pole changing, . | Talks and presentations | 12 |
| Unit-3 | Single phase Induction Motor: Double revolving field theory, Equivalent circuit, No load and blocked rotor tests, Starting methods, repulsion motor AC Commutator Motors: Universal motor, Single phase a.c. series compensated motor, stepper motors | Talks and presentations | 12 |
| Unit-4 | Synchronous Machine- I Constructional features, Armature winding, EMF Equation, Winding coefficients, equivalent circuit and phasor diagram, Armature reaction, O. C. & S. C. tests, Voltage Regulation using Synchronous Impedance Method, , Parallel Operation of synchronous generators, operation on infinite bus, synchronizing power and torque co-efficient | Talks and presentations | 12 |
| Unit-5 | Synchronous Machine- II Two Reaction Theory, Power flow equations of cylindrical and salient pole machines, operating Characteristics Synchronous Motor: Starting methods, Effect of varying field current at different loads, V- Curves, Hunting & damping, synchronous condenser | Talks and presentations | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Implementation of rectifying circuit for mobile charging. | PBL | BL6-Create | 8 |
| 2 | Load test of single phase induction motor | Experiments | BL4-Analyze | 2 |
| 3 | speed control of induction motor by v/f method | Experiments | BL3-Apply | 2 |
| 4 | Load test of squirrel cage IM | Experiments | BL4-Analyze | 2 |
| 5 | Load test of slip ring IM | Experiments | BL4-Analyze | 2 |
| 6 | V and inverted v-curve of synchronous motor | Experiments | BL5-Evaluate | 2 |
| 7 | constructional features of single phase IM | Experiments | BL3-Apply | 2 |
| 8 | constructional features of three phase IM | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | D.P.Kothari & I.J.Nagrath Electric Machines Tata Mc Graw Hill |
| **Articles** | |
| **References Books** | P.S.Bimbhra Electrical Machinery Khanna Publisher<br>M.G.Say Alternating Current Machines Pitman & Sons<br>B.L. Theraja Electrical Technology S. Chand publication |
| **MOOC Courses** | 1.Electrical Machines - II,Electrical Engineering,Prof. Tapas Kumar Bhattacharya,IIT Kharagpur https://archive.nptel.ac.in/courses/108/105/108105131/ 2.Modelling and Analysis of Electric Machines Electrical Engineering,Dr. Krishna Vasudevan,IIT Madras https://archive.nptel.ac.in/courses/108/106/108106023/ |
| **Videos** | 1.https://www.youtube.com/watch?v=59HBoIXzX_c 2.https://www.youtube.com/watch?v=b5tc0FrYk60 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO2 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO3 | 1 | - | 1 | - | 1 | - | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 3 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Machine-II |
| **Course Code** | EEL 0507 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | To knowledge about basic connection of electrical circuits | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | Load test of single phase induction motor | Experiments | BL2-Understand | 2 |
| Experiment-2 | speed control of induction motor by v/f method | Experiments | BL3-Apply | 2 |
| Experiment-3 | Load test of squirrel cage IM | Experiments | BL4-Analyze | 2 |
| Experiment-4 | Load test of slip ring IM | Experiments | BL5-Evaluate | 2 |
| Experiment-5 | V and inverted v-curve of synchronous motor | Experiments | BL5-Evaluate | 2 |
| Experiment-6 | constructional features of single phase IM | Experiments | BL2-Understand | 2 |
| Experiment-7 | constructional features of three phase IM | Experiments | BL2-Understand | 2 |
| Experiment-8 | constructional features of synchronous machine | Experiments | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power System Stability |
| **Course Code** | EEL 0542 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Able to get the basic know symmetrical components**(BL1-Remember)**<br>**CO2-** Able to understand different type of symmetrical and asymmetrical faults happened in power system**(BL2-Understand)**<br>**CO3-** Able to understand stability of power system**(BL3-Apply)**<br>**CO4-** Able to understand swing equations and equal area criterions**(BL4-Analyze)**<br>**CO5-** Able to understand basics on power system protection system**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth)<br>SDG10(Reduced inequalities)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Symmetrical fault analysis: Transient in Transmission systems, calculation of 3-phase short circuit current and reactance of synchronous machine, internal voltage of loaded machines under transient conditions. Symmetrical Components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks. for various power system components and overall power system | Talks and presentations | 15 |
| 2 | Unsymmetrical fault analysis : Symmetrical component analysis of un symmetrical faults. Analysis of single line to ground fault, line-to-line fault and Double Line to ground fault on an unloaded generators and power system network with and without fault impedance. Formation of Zubs for analysis of unsymmetrical shunt fault | Talks and presentations | 12 |
| 3 | Power System Stability: Stability and Stability limit, Steady state stability study, derivation of Swing equation, transient stability studies by equal area criterion and step-by-step method. Factors affecting steady state and transient stability and methods of improvement. | Talks and presentations | 13 |
| 4 | Power System Transients Types of system transients, Travelling waves or propagation of surges .Generation of overvoltage on Transmission lines . Protection of power system apparatus against surges. Insulation coordination | Talks and presentations, group discussions | 10 |
| 5 | Power System Protection: Protective Zones. Relaying element and quality. Current and Voltage transformers. Relay types and characteristics. Relay hardware .Protection of transmission lines. Generator and motor protection .Transformer protection. Sequence Filters. Microprocessor based relaying. | Talks and presentations | 10 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | W. D. Stevenson Jr., 2ndEd. " Power System Analysis", McGraw Hill |
| **Articles** | |
| **References Books** | 1.Power System Stability and Control" by P.Kundur 2.Power System Dynamics and Stability" by P.Sauer and M.A.Pai |
| **MOOC Courses** | 1.Power System Protection and Switchgear Electrical Engineering Prof. Bhaveshkumar R. Bhalja IIT Roorkee 2.DC Power Transmission Systems Electrical Engineering Prof. Krishna S IIT Madras 3.Power System Dynamics, Control and Monitoring Electrical Engineering Prof. Debapriya Das IIT Kharagpur |
| **Videos** | 1.https://www.youtube.com/watch?v=M8Y-1g47UpU 2.https://www.youtube.com/watch?v=zeSEFsR-jZA 3.https://www.youtube.com/watch?v=bCy62oTr_CQ |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | - | 1 | 1 | 2 | 1 | 2 |
| CO2 | 1 | - | 1 | 1 | 1 | - | 1 | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | 1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO4 | 1 | 1 | 1 | 1 | - | 1 | - | 1 | - | - | 1 | - | 2 | 3 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Linear Control Systems |
| **Course Code** | EEL 0612 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Laplace transform and Fourier transform. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the transfer function model for Physical systems**(BL1-Remember)**<br>**CO2-** Illustrate adequate knowledge in the time response of systems and steady state error analysis..**(BL2-Understand)**<br>**CO3-** Examine the frequency-domain response of closed loop system.**(BL3-Apply)**<br>**CO4-** Build a compensator system satisfying requirements. **(BL4-Analyze)**<br>**CO5-** Analyze the stability of linear systems**(BL5-Evaluate)**<br>**CO6-** Develop state models for linear time invariant system.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Introduction to Control Systems: Types of control systems, Effect of feedback systems, Transfer functions, Block diagrams, Signal Flow graphs, Mason's gain formula , Differential equations of physical systems – Mechanical systems, Translational systems Rotational systems, Electrical systems, Analogous systems. | Talks and presentations | 11 |
| Unit 2 | Time Response analysis: Standard test signals, Unit step response of First and second order systems, Time response specifications, Time response specifications of second order systems, steady state errors and error constants. Feedback control actions: Proportional, derivative and integral | Talks and presentations | 13 |
| Unit 3 | Stability analysis: Concepts of stability, Necessary conditions for Stability, Routh-Hurwitz stability criterion, Relative stability analysis; Special cases of RH criterion. Root locus concepts, construction of root loci | Talks and presentations | 12 |
| Unit 4 | Frequency response Analysis: Frequency response, correlation between time and frequency responses, polar plots, Bode plots , Effect of adding poles and Zeros. Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin. | Talks and presentations | 10 |
| Unit 5 | Introduction to Design: The design problem and preliminary considerations lead, lag and lead-lag networks , Design of compensating networks. Review of state variable technique: Concepts of state, state variable and state models for electrical systems, Solution of state equations. conversion of state variable model to transfer function model and vice-versa, diagonalization, Controllability and observability and their testing | Talks and presentations | 14 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | study and analysis of stroboscope | Experiments | BL2-Understand | 2 |
| Experiment-2 | stepper motor application and uses | Experiments | BL3-Apply | 2 |
| Experiment-3 | servo motor testing | Experiments | BL4-Analyze | 2 |
| Experiment-4 | Study of P,PI,PID controller | Experiments | BL2-Understand | 2 |
| Experiment-5 | Uses of function generator | Experiments | BL2-Understand | 2 |
| Experiment-6 | Compensation design | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | Nagrath & Gopal "Control System Engineering", 4th Edition New age International. |
| **Articles** | |
| **References Books** | Gopal M Control System : Principles & Design. TMH<br>B.C. Kuo Automatic Control systems PHI |
| **MOOC Courses** | 1.Advanced Linear Continuous Control Systems: Applications with MATLAB Programming and Simulink Electrical Engineering Prof. Yogesh Vijay Hote IIT Roorkee 2.Nonlinear Control System Electrical Engineering Dr. Arun D. Mahindrakar IIT Madras |
| **Videos** | 1.https://www.youtube.com/watch?v=HcLYoCmWOjI 2.https://www.youtube.com/watch?v=DtV0ASunhqU 3.https://www.youtube.com/watch?v=XMfH2P2Fc6Q |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | - | 1 | 1 | - | - | - | 1 | - | - | 1 | - | - |
| CO2 | - | - | 1 | - | 1 | - | - | 1 | - | - | - | - | - | - | 1 |
| CO3 | 1 | - | - | 1 | - | 1 | - | - | - | - | - | - | - | 1 | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | - | - | - | - | - |
| CO6 | 1 | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Linear Control Systems |
| **Course Code** | EEL 0612 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | study and analysis of stroboscope | Experiments | BL2-Understand | 2 |
| Experiment-2 | stepper motor application and uses | Experiments | BL3-Apply | 2 |
| Experiment-3 | servo motor testing | Experiments | BL3-Apply | 2 |
| Experiment-4 | Study of P,PI,PID controller | Experiments | BL2-Understand | 2 |
| Experiment-5 | Uses of function generator | Experiments | BL3-Apply | 2 |
| Experiment-6 | Compensation design | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power System Protection |
| **Course Code** | EEL 0643 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Prerequisites: To understand the contents and successfully complete this course, a participant must have a basic understanding of Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various terms and components of power system protection system**(BL1-Remember)**<br>**CO2-** To understand the different components of power system protection and protection procedure of different high cost equipments in the system**(BL2-Understand)**<br>**CO3-** set up the protection system transformer, generator, transmission line and other devices**(BL3-Apply)**<br>**CO4-** To analyze the required components for a particular protection requirement**(BL4-Analyze)**<br>**CO5-** To evaluate the fault and tripping of circuit in the fault case**(BL5-Evaluate)**<br>**CO6-** To create a business continuity plan**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Relays I: General considerations, sensing of faults, construction of electro-magnetic attraction and induction types relays, Buchholz and negative sequence relay, concept of reset, pick up, inverse time and definite time characteristics, | Talks and presentations | 12 |
| Unit-2 | Relays II: Over current, over voltage, directional, differential and distance relays on R-X diagram. Static Relays: Introduction, advantage and limitation of static relays, static over current, directional, distance and differential relays | Talks and presentations, ,Brainstorming | 12 |
| Unit-3 | Protection: Types & detection of faults and their effects, alternator protection scheme (stator, rotor, reverse power protection etc.). Power transformer protection (external and internal faults protection), generator-transformer unit protection scheme, bus bar protection. Transmission line protection (current/time grading, distance), Pilot relaying schemes, power line carrier protection. | Talks and presentations, case study | 12 |
| Unit-4 | Switchgear I: Theory of current interruption- energy balance and recovery rate theory,. Types of circuit breakers. bulk oil and minimum oil, air break and air blast, sulphur hexa fluride (SF6) and vacuum circuit breakers | Talks and presentations | 12 |
| Unit-5 | Switchgear II: Rating selection and testing of circuit breakers/operating mechanisms. LT switchgear, HRC fuses, types construction and applications. arc quenching, recovery and restriking voltages , voltage collapse | Talks and presentations, field work | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study Characteristics of solid state Over Voltage/Under Voltage Relay | Experiments | BL4-Analyze | |
| 2 | To study Characteristics of Static Type over current Relay | Experiments | BL4-Analyze | |
| 3 | UNDER VOLTAGE RELAY STATIC TYPE | Experiments | BL5-Evaluate | |
| 4 | TO STUDY IDMT OVER CURRENT RELAYS SINGLE PHASE AND TO DETERMINE THE PICKUP AND RESET VALUE. | Experiments | BL4-Analyze | |
| 5 | TO STUDY LINE TO LINE FAULT | Experiments | BL4-Analyze | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | I.J.Nagrath & D.P.kothari Modern Power system Analysis tata mc graw-hill publication company ltd 2nd edition<br>C.L. wadhwa Electrical power systems new age international (p) litmited publishers, 2nd edition 1998 |
| **Articles** | |
| **References Books** | T.J.E miller,john Reactive power control in electric systems wiley&Sons<br>T.K. Nagsarkar, M.S. sukhiz power system analysis oxford university press<br>Elgerd O.I electrical energy systems theory TMH new delhi second edition 1983 |
| **MOOC Courses** | 1.Control and Tuning Methods in Switched Mode Power Converters Electrical Engineering Prof. Santanu Kapat IIT Kharagpur 2.Power System Protection and Switchgear Electrical Engineering Prof. Bhaveshkumar R. Bhalja IIT Roorkee 3.Control and Tuning Methods in Switched Mode Power Converters Electrical Engineering Prof. Santanu Kapat IIT Kharagpur |
| **Videos** | 1.https://www.youtube.com/watch?v=2vUsMWqBc2g 2.https://www.youtube.com/watch?v=JZueXc4WklA |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 3 |
| CO3 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | - | 1 | - | - | - | 1 | - | 2 | 3 | 2 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Principles of Electrical Engineering |
| **Course Code** | EEL0201 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Predict the behavior of any electrical circuits, Formulate and solve complex DC circuits.**(BL1-Remember)**<br>**CO2-** Predict the behavior of any electrical circuits, Formulate and solve complex single phase AC circuits.**(BL2-Understand)**<br>**CO3-** Predict the behavior of any electrical circuits, Formulate and solve complex Three phase AC circuits.**(BL3-Apply)**<br>**CO4-** Identify the type of electrical machine used for that particular application. Realize the requirement of transformers in transmission and distribution of electric power and other applications.**(BL4-Analyze)**<br>**CO5-** Predict the behavior of various measuring instruments in electrical engineering**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | D.C. Circuit: - Combination of resistance in series & parallel, their solution ,Star –Delta combination, KCL and KVL. Voltage and current sources, dependent and independent sources, source conversion, DC circuit's analysis using mesh & nodal method, Superposition theorem. | Talks and presentations | 12 |
| 2 | Single Phase Circuit:- Generation of Alternating Voltage & Currents, Their Equation, Definition, R.M.S and Average values, Vector representation of alternating quantities, Phasor relations between voltage & current in each of resistance, inductance and capacitance, A.C series circuit power & power factor , Resonance in series circuit. | Talks and presentations | 11 |
| 3 | Electrical Measuring Instruments:-Introduction and classification of Electrical Instruments, Essentials of indicating instruments, Moving iron instruments, Types ofmoving iron instruments, Advantages and Disadvantages of moving iron instruments, Applications of moving iron equipment, Permanente Magnet type moving coil instruments, extension of range of ammeters and voltmeter, Dynamometer type instruments, Dynamometer type wattmeters | Talks and presentations | 13 |
| 4 | Poly-phase Circuits:-Generation of Poly-phase Voltages, 3phase system, Phase sequence, Inter connection of 3 phases, Voltage, Currents & Power relationships in balanced 3 phase circuits, Power Measurement in single phase & 3 phase circuits.. | Talks and presentations | 11 |
| 5 | Transformer:- Construction & working principle of transformer, Emf equation, No load & Full load phasor diagram , Equivalent circuit, Losses & Efficiency, Voltage Regulation, Open circuit & Short Circuit Test on the Transformer | Talks and presentations | 13 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To verify Kirchoff's current law and voltage law | Experiments | BL2-Understand | 2 |
| 1 | To verify superposition theorem | Experiments | BL3-Apply | 2 |
| 2 | Measurement Of Active & Reactive power in Single Phase AC circuit and three phase ac circuit | Experiments | BL2-Understand | 2 |
| 2 | Measurement of Impedance of R-L, R-C, R-L-C & study of resonance phenomena | Experiments | BL2-Understand | 2 |
| 2 | Measurement Of Power & Power factor in a Single Phase AC Circuit using Three Ammeter Method | Experiments | BL3-Apply | 2 |
| 4 | Measurement of line quantities and phase quantities in a three phase ac circuit | Experiments | BL4-Analyze | 2 |
| 5 | Study of transformer name plate rating and determination of its transformation ratio | Experiments | | 2 |
| 5 | To perform load test on a single-phase transformer | Experiments | BL2-Understand | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition |
| **Articles** | |
| **References Books** | Basic Electrical Engg, Sunil S Gaikwad, Dream Tech/ Willey Publication. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 1 | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 | 2 |
| CO2 | 1 | 1 | 2 | 1 | 1 | 1 | - | 1 | - | - | 1 | 1 | 2 | 3 | 1 |
| CO3 | 2 | 1 | 2 | 1 | 2 | - | 1 | - | - | - | 1 | 1 | 1 | 2 | 2 |
| CO4 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | 1 | 1 | 3 | 1 | 3 |
| CO5 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | 1 | - | 2 | 2 | 1 |
| CO6 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 1 | 3 | 2 |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Architecture of Electric Vehicle and solar Panels |
| **Course Code** | EEL0233 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of EV & HEV | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Identify various types of EV's and their characteristics**(BL1-Remember)**<br>**CO2-** Describe battery basics and their types in EV and HEV.**(BL2-Understand)**<br>**CO3-** Identify various types of electrical machines used in EV installation.**(BL3-Apply)**<br>**CO4-** Describe Solar panel design and integration. **(BL4-Analyze)**<br>**CO5-** Identify installation and commissioning of solar panel.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Battery electric vehicles, The IC engine/electric hybrid vehicle, fuelled electric vehicles, Electric vehicles using supply lines, Solar powered vehicles, Electric vehicles which use flywheels or super capacitors, Electric Vehicles for the Future | talks and presentations | 8 |
| II | Electric Vehicle Operation, Battery Basics, Introduction to Electric Vehicle Batteries, Fuel Cell Technology, Choice of a Battery, ElectricVehicle Body and Frame, Fluids, Lubricants, and Coolants, Effects of Current Density on Battery Formation, Effects of Excessive Heat on Battery Cycle Life, Battery Storage, Battery Capacity | talks and presentations, PBL | 8 |
| III | Real-Time Model of a Two-Phase PMSM, PM Brushless DC Machine for EV, Switched Reluctance Motor (SRM) uses in EV, Synchronous Reluctance Motor (SyRM) for EV and HEV, Linear Induction Motor (LIM) – Construction, DC Linear Motor (DCLM) for EV, Analyze the control aspects of brushless DC motor | talks and presentations | 9 |
| IV | Solar Radiation Energy Measurements, Estimating Energy requirement, Types of Solar PV System, Design methodology for SPV system, Design of Off Grid Solar Power Plant, Case studies of 3KWp Off grid Solar PV Power Plant, Design and Development of Solar Street Light and Solar Lantern, Off Grid Solar power Plant | talks and presentations, Field visits | 8 |
| V | Installation and Trouble shooting of Standalone Solar PV System, Maintenance of Solar PV System, Safety in installation of Solar PV System, Maintenance of Solar PV System. Installation, Commissioning, Trouble shooting of 1KWp off Grid Solar Power Plant, Check list for Solar PV Plant Installation and Commissioning | talks and presentations, PBL | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Familiarization of EV control Modules | Experiments | BL2-Understand | 2 |
| I | Study of observer design for EV | Experiments | BL3-Apply | 2 |
| III | PI and PID controller for EV | Experiments | BL4-Analyze | 2 |
| III | Speed control of DC shunt machine for EV | Experiments | BL5-Evaluate | 2 |
| II | Speed control of Induction machine for EV | Experiments | BL5-Evaluate | 2 |
| IV | To plot V-I characteristics of solar cell and determine the fill factor | Experiments | BL5-Evaluate | 2 |
| IV | Series and parallel connections of solar cells | Experiments | BL5-Evaluate | 2 |
| V | Testing of photovoltaic cells | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1. Vehicle Powertrain Systems by Behrooz Mashadi and David Crolla, Wiley, 2012 2. Automotive Aerodynamics by Joseph Katz, Wiley, 2016 3. Automotive Chassis Engineering, by David C. Barton and John D. Fieldhouse, Springer, 2018 4. Automotive Engineering Powertrain, Chassis System and Vehicle Body Edited by David A. Crolla, Elsevier,2009 5. Automotive Power Transmission Systems by Yi Zhang and Chris Mi, Wiley, 2018 6. Linear Electric Machines, Drives, and MAGLEVs Handbook, by Ion Boldea, CRC Press. 2013 |
| **Articles** | |
| **References Books** | 1.Encyclopaedia of Automotive Engineering edited by David Crolla et al, Wiley, 2014 2. Design and Control of Automotive Propulsion Systems by Zongxuan Sun and Guoming Zhu, CRC Press, 2015 3. The Automotive Transmission Book by Robert Fischer, Ferit Küçükay, Gunter Jürgens, Rolf Najork, and Burkhard Pollak, Springer, 2015 4. Noise and Vibration Control in Automotive Bodies by Jian Pang, Wiley, 2019 |
| **MOOC Courses** | 1.https://onlinecourses.nptel.ac.in/noc22_ee53/preview Fundamentals of Electric vehicles: Technology & Economics, IIT Madras Prof. Ashok Jhunjhunwala Prof. Prabhjot Kaur Prof. Kaushal Kumar Jha Prof. L Kannan 2.https://nptel.ac.in/courses/108106170 Electric Vehicles - Part 1 By Prof. Amit Jain \| IIT Delhi |
| **Videos** | 1.https://www.youtube.com/watch?v=UgtjRob5qMg&list=PLyqSpQzTE6M9spod-UH7Q69wQ3uRm5thr 2.https://www.youtube.com/watch?v=mNOYS-duUJY |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 1 | - | 1 | - | - | 1 | - | - | - | - | 1 | - |
| CO2 | - | - | 1 | - | - | - | 1 | - | - | 1 | - | 2 | - | - | - |
| CO3 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | 1 | - | 2 | - | 2 | - | - | - | - | - | - | 1 |
| CO5 | - | - | 2 | - | - | - | - | - | - | - | 1 | - | 1 | - | - |
| CO6 | 2 | - | - | - | 1 | - | - | - | 3 | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Circuit Theory and Networks |
| **Course Code** | EEL0302 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** • To introduce different circuit elements and theorems**(BL1-Remember)**<br>**CO2-** • To find out different circuit parameters**(BL3-Apply)**<br>**CO3-** • Implement theorems and logic in analysis of circuits**(BL3-Apply)**<br>**CO4-** • Familiarize with steady state and transient analysis**(BL2-Understand)**<br>**CO5-** Circuit implementation or design.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to circuit elements R,L,C and their characteristics in terms of linearity & time dependant nature, voltage & current sources controlled & uncontrolled sources KCL and KVL analysis, Nodal & mesh analysis, Network Theorems for AC & DC circuits- Thevenins & Norton's, Superposition's, Reciprocity, Compensation, Substitution, Maximum power transfer, and Millman's theorem, Tellegen's theorem, problems with dependent & independent sources . | Talks and presentations | 12 |
| 2 | Steady state analysis: Concept of phasor & vector, impedance & admittance, tuned circuits, Series & parallel resonance. Analysis of magnetically coupled circuits, coupling coefficient and Dot convention. | Talks and presentations | 12 |
| 3 | Transient analysis: Transients in RL, RC & RLC Circuits, initial conditions, time constants | Talks and presentations | 12 |
| 4 | Laplace transform and its Applications, solution of Integro-differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial & final value theorem, Network Theorems in transform domain. | Talks and presentations | 11 |
| 5 | Network function & Two port networks: concept of complex frequency, Network & Transfer functions for one port & two ports, Two port parameters – Z,Y, ABCD, Hybrid parameters, their inverse & image parameters, relationship between parameters, Interconnection of two ports networks, Terminated two port network. | Talks and presentations | 13 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Text Books: 1. M.E. Van Valkenburg, Network Analysis, (PHI) 2. Pankaj Swarnkar,Network Analysis and Synthesis;Satya Prakashan |
| **Articles** | |
| **References Books** | References: 1. F.F.Kuo, Network Analysis. 2. Mittal GK; Network Analysis; Khanna Publisher 3. Mesereau and Jackson; Circuit Analysis- A system Approach; Pearson. 4. Sudhakar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH 5. Hayt W.H. & J.E. Kemmerly; Engineering Circuit Analysis; TMH 6. Decarlo lin; Linear circuit Analysis; Oxford 7. William D Stanley : Network Analysis with Applications, Pearson Education 8. Roy Choudhary D; Network and systems; New Age Pub 9. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits :TMH 10. Chakraborti :Circuit theory: Dhanpat Rai 11. B.Chattopadhyay & P.C.Rakshit; Fundamental of Electrical circuit theory; S Chand 12. Nilson & Riedel , Electric circuits ;Pearson |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 3 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical & Electronic Materials |
| **Course Code** | EEL0304 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** to understand different conducting materials**(BL2-Understand)**<br>**CO2-** to understand different semiconducting materials**(BL2-Understand)**<br>**CO3-** to understand different magnetic materials**(BL2-Understand)**<br>**CO4-** to understand different insulating materials**(BL2-Understand)**<br>**CO5-** to classify different materials**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Conducting Material: Classification and main properties, High resistivity alloy: Constantan Manganin, Nichrome, properties of copper, Aluminum, steel tungsten, Molybdenum, Platinum, Tantalum, Niobium, Mercury, Nickel, Titanium, Carbon, Lead, thermocouple, materials, specific resistance, conductance, variation of resistance with temperature, super conductors. | Talks and presentations | 10 |
| 2 | Semi Conductor Materials: General conception, variation of electrical conductivity, Elements having semiconductor properties, general application, hall effect, energy levels, conduction in semiconductors, Intrinsic conduction, impurity conduction, P and N type impurities, electrical charge, Drift, Mobility current flow in semi conductors P-N junction formation by alloying, (forward and reverse) of P-n junction, Reverse separation current. | Talks and presentations | 9 |
| 3 | Magnetic Materials: Details of magnetic materials, relation between B. H. and μ, soft and hard magnetic materials. Di-magnetic, Para magnetic and Ferromagnetic materials, electrical sheet steel, cast iron. Permanent magnetic materials. Dynamic and static hysteresis loop. Hysteresis loss, eddy current loss, Magnetization, magnetic susceptibility, coercive force, core temperature, rectangular hysteresis loops. | Talks and presentations | 8 |
| 4 | Insulating Materials: General electrical mechanical and chemical properties of insulating material, Electrical characteristics volume and surface resistivity complex permittivity loss, and dielectric loss, equivalent circuits of an imperfect dielectric polarization and polarisability classification of dielectric. | Talks and presentations | 9 |
| 5 | Classification of insulating materials on the basis of temperature rise. General properties of transformer oil, commonly used varnishes, solidifying insulating materials, resins, bituminous waxes, drying oils, Fibrous insulating materials, wood, paper and cardboard, insulating textiles, varnished adhesive tapes, inorganic fibrous material and other insulating materials, such as mica, ceramic, Bakelite, ebonite, glass, PVC, rubber, other plastic molded materials. | Talks and presentations | 9 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Text Books: 1. A.J.Dekker: Electrical Engineering Materials PHI 2. Indulkar and S. Thruvengadem; Electrical Engineering Materials; S. Chand |
| **Articles** | |
| **References Books** | References: 1. Kortisky; Electrical Engineering Materials: 2. Electrical Engineering Material s & Devices; John Allison ;TMH 3. Materials for Electrical Engineering: B.M. Tareev. 4. Anderson; Di-Electrics : |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Energy Storage Systems for electric vehicles |
| **Course Code** | EEL0334 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basics of vehicle mechanism | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the basic history of electric vehicles.**(BL1-Remember)**<br>**CO2-** Discuss the various energy storage systems**(BL2-Understand)**<br>**CO3-** Analyze the battery characteristics & parameters**(BL3-Apply)**<br>**CO4-** Enlighten the battery management system**(BL5-Evaluate)**<br>**CO5-** Apply the knowledge battery testing, disposal & recycling to avoid environmental pollution for the betterment of society**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Energy storage systems overview - Scope of energy storage, needs and opportunities in energy storage, Technology overview and key disciplines, comparison of time scale of storages and applications, Energy storage in the power and transportation sectors. Importance of energy storage systems in electric vehicles, Current electric vehicle market. | talks and presentations | 7 |
| II | Batteries: Lead Acid Battery, Nickel based batteries, Sodium based batteries, Lithium based batteries – Li-ion & Li-poly, Metal Air Battery, Zine Chloride battery; Ultra capacitors; Flywheel Energy Storage System; Hydraulic Energy Storage System; Comparison of different Energy Storage System. | talks and presentations | 8 |
| III | 20.05.2022 2/3 Cells and Batteries- conversion of chemical energy to electrical energy- Battery Specifications: Variables to characterize battery operating conditions and Specifications to characterize battery nominal and maximum characteristics; Efficiency of batteries; Electrical parameters Heat generation- Battery design- Performance criteria for Electric vehicles batteries- Vehicle propulsion factors- Power and energy requirements of batteries- Meeting battery performance criteria- setting new targets for battery performance | talks and presentations | 9 |
| IV | Selection of battery for EVs & HEVs, Traction Battery Pack design, Requirement of Battery Monitoring, Battery State of Charge Estimation methods, Battery Cell equalization problem, thermal control, protection interface, SOC Estimation, Energy & Power estimation, Battery thermal management system, Battery Management System: Definition, Parts: Power Module, Battery, DC/DC Converter, load, communication channel, Battery Pack Safety, Battery Standards & Tests. | Chalk and talk/power point presentation,Videos/Learning material | 9 |
| V | Chemical & structure material properties for cell safety and battery design, battery testing, limitations for transport and storage of cells and batteries, Recycling, disposal and second use of batteries. Battery Leakage: gas generation in batteries, leakage path, leakage rates. Ruptures: Mechanical stress and pressure tolerance of cells, safety vents, Explosions: Causes of battery explosions, explosive process. | talks and presentations | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Develop a comparative case Study of different types of batteries with their characteristics & detailed specifications. | Experiments | BL2-Understand | 2 |
| II | Perform Vibration Test for traction batteries (Lead-Acid/Li-ion) as per AIS 048 standard. | Experiments | BL4-Analyze | 2 |
| II | Perform Shock Test for traction batteries (Lead-Acid/Li-ion) as per AIS 048 standard. | Experiments | BL5-Evaluate | 2 |
| III | SOC Estimation by Open Source voltage for Lead-Acid battery, Ni-MH battery and Liion battery | Experiments | BL4-Analyze | 2 |
| III | SOC Estimation by specific gravity for Lead-Acid battery. | Experiments | BL5-Evaluate | 2 |
| IV | Design a circuit for Battery monitoring System for Lead acid battery. | Experiments | BL4-Analyze | 2 |
| V | Series connection of batteries. | Experiments | BL5-Evaluate | 2 |
| V | Prallel connection of batteries | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1.Energy Resource Management, Krupal Singh Jogi (Sarup & Sons). 2. Non-Conventional Energy resources, Dr. B.H. Khan, Tata McGraw Hill. 3. Electrochemical Energy Storage: Physics and Chemistry of Batteries, De Gryuter, Reinhart Job. 4. Batteries: Materials Principles and Characterization Methods, Chen Liao, Chemical Sciences and Engineering Division, Argonne National Laboratory, Lemont, USA. 5. Batteries, Fuel Cells, and related Electrochemistry, U.S. Department of Energy, Washington, D.C. 2058 |
| **Articles** | |
| **References Books** | 1..Encyclopaedia of Automotive Engineering edited by David Crolla et al, Wiley, 2014 2. Design and Control of Automotive Propulsion Systems by Zongxuan Sun and Guoming Zhu, CRC Press, 2015 3. The Automotive Transmission Book by Robert Fischer, Ferit Küçükay, Gunter Jürgens, Rolf Najork, and Burkhard Pollak, Springer, 2015 4. Noise and Vibration Control in Automotive Bodies by Jian Pang, Wiley. |
| **MOOC Courses** | 1.https://nptel.ac.in/courses/108106170 2.https://onlinecourses.nptel.ac.in/noc22_ee53/preview |
| **Videos** | 1.https://www.youtube.com/watch?v=mNOYS-duUJY 2.https://www.youtube.com/watch?v=nrxmQhbZUTc&t=100s |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 1 | - | - | 1 | 1 | - | - | - | 1 | - | 1 | - |
| CO2 | - | 1 | - | - | 1 | - | - | - | 1 | 1 | - | - | - | - | - |
| CO3 | 2 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | - | 1 |
| CO4 | - | - | - | 2 | - | - | 1 | - | 2 | - | - | - | 1 | - | - |
| CO5 | - | - | - | - | 1 | - | - | 2 | - | - | 2 | - | - | - | - |
| CO6 | - | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Digital Electronics and Logic Design |
| **Course Code** | EEL0340 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** to introduces number systems and code systems. **(BL2-Understand)**<br>**CO2-** To explains about Boolean operations and different logic gates**(BL2-Understand)**<br>**CO3-** to understand and explains about the concept of data processing circuits like encoder, decoder, multiplexer and demultiplexer**(BL3-Apply)**<br>**CO4-** to understand about the types of latches and flip-flops**(BL2-Understand)**<br>**CO5-** to design different electronics circuits**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Binary systems and logic gates: Digital Computer and Digital Systems, Number Systems & its conversions, Addition & Subtraction of numbers, Complements, Subtraction using compliments, Binary codes, Binary Storage and Registers, Binary Logic, Integrated Circuits. Boolean Algebra – Definitions, Theorems, Properties & Function, Canonical and Standard forms, Digital logic gates , IC Digital Logic Families. | Talks and presentations | 10 |
| 2 | Simplification of boolean funcions: The map method, Two and three Variable Maps, Four Variable Maps, Five- and Six- Variable Maps, Product of sums simplification, NAND and NOR Implementation, Two level implementation, Don,t–Care Conditions, Tabulation Method, Determination of prime- Implicants, Selection of prime- Implicants. | Talks and presentations | 9 |
| 3 | Combinational logic: Introduction, Design Procedure, Adders, Subtractor, Parity Generator, Code conversion, Analysis procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive-OR and Equivalence functions, Magnitude Comparator, Encoder, Decoder, Multiplexers, Demultiplexer, PLA & ROM. | Talks and presentations | 8 |
| 4 | Sequential logic: Introduction, Flip-FLOPS: SR, D, T, JK. Triggering of Flip-FLOPS, Analysis of clocked sequential Circuits, State Reduction and Assignment, Flip-FLOP excitation tables, Conversion between the flip –flops, Design Procedure, Design with state equations. | Talks and presentations | 9 |
| 5 | Registers, counters & memory unit: Registers, Registers with Parallel loading.Shift Registers: SISO, SIPO, PISO, PIPO, Bi-directional and unidirectional shift registers. Applications of Shift Registers. Counters: Ripple counters, Synchronous counters, Mode N Counters, Ring and Johnson counters. Timing Sequences. Memory Unit, Cache. Random Access Memories: SRAM & DRAM. | Talks and presentations | 9 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1. Mano, M.M., Digital Design, Prentice Hall |
| **Articles** | |
| **References Books** | Reference Book: 1. Fletcher, W.I., Engineering Approach to Digital Design, Prentice Hall of India 2. Millman and Taub : Pulse, Digital and Switching Waveforms, MGH 3. W.H. Gothman : Digital Electronics, PHI. 4. Leach and Malvino : Digital Principles and Applications, TMH |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Machines-I |
| **Course Code** | EEL0405 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | To knowledge about basic connections | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | Constructional features of single phase and three phase transformer | Experiments | BL2-Understand | 2 |
| Experiment-2 | Polarity test of single phase transformer | Experiments | BL3-Apply | 2 |
| Experiment-3 | Parallel operation of single phase transformer | Experiments | BL4-Analyze | 2 |
| Experiment-4 | Back to back or sumpner test of single phase transformer | Experiments | BL5-Evaluate | 2 |
| Experiment-5 | Scott connection | Experiments | BL3-Apply | 2 |
| Experiment-6 | Constructional features of DC machine | Experiments | BL2-Understand | 2 |
| Experiment-7 | Load test of DC shunt machine | Experiments | BL3-Apply | 2 |
| Experiment-8 | Swinburne test | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Machines-I |
| **Course Code** | EEL0405 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | TO KNOWLEDGE ABOUT BASIC PHYSICS AND VARIOUS LAWS | | | **Co-Requisite/s** | To know about basic electrical engineering | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Predict the behavior of single phase transformer**(BL1-Remember)**<br>**CO2-** Predict the behavior of three phase transformer**(BL2-Understand)**<br>**CO3-** Predict the behavior of electro mechenical energy conversion**(BL3-Apply)**<br>**CO4-** Predict the behavior of DC machine**(BL4-Analyze)**<br>**CO5-** Predict the behavior of DC motor**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Transformers (single Phase) : Review of single phase transformer . Parallel operation of single phase transformer, Load sharing with equal turns ratio and unequal turns ratio . Sumpner`s test. Different types of transformers including dry type transformer, Auto-transformer construction, working & applications, | Talks and presentations | 12 |
| Unit-2 | Transformers (Three Phase): Constructional features and working principle of a Three Phase transformer Determination of polarity and connections, (Star/star, star/delta, delta/star, star/zigzag, delta/zigzag, open delta), phasor groups. Effects of unbalanced loading,3-phase to 2- phase transformation, Scott connection, 3-phase to six phase conversion, double star & double delta. 3-winding transformers, Parameter estimation. Applications. Introduction to tap changers and their functions. | Talks and presentations, Solution-based learning | 12 |
| Unit-3 | Electro-mechanical Energy Conversion - Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems(defining energy & Co-energy),Singly Excited Systems, determination of mechanical force, mechanical energy, torque equation , Doubly excited Systems, Energy stored in magnetic field, electromagnetic torque , Generated emf in machines; torque in machines with cylindrical air gap . | Talks and presentations,Group discussions | 12 |
| Unit-4 | Direct Current machines: Review of construction, types of armature winding, physical concepts ofwinding pitches, derivation of EMF equation & types of excitation. Armature reaction and its effect on the performance, methods adopted for compensation of armature reaction. . Compensating winding, Commutation and function of commutators. Improvement of commutation: Brush shift and interpoles. Characteristics of DC generator: separately excited, shunt, series and compound generators. | Talks and presentations | 12 |
| Unit-5 | Direct Current motors: Review of types of DC motors. Torque equation, speed torque characteristics:shunt, series and compound motors. Characteristics of machines , Starting & speed control of DC motors.3- point starter & its step calculation. Speed control by controlling armature resistance, field excitation and armature voltage. Ward-Leonard method of speed control. Losses & efficiency of DC machines, Hopkinson's & Swinburne's test. | Talks and presentations | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Constructional features of single phase and three phase transformer | Experiments | BL2-Understand | |
| 2 | Polarity test of single phase transformer | Experiments | BL3-Apply | |
| 3 | Parallel operation of single phase transformer | Experiments | BL4-Analyze | |
| 4 | Back to back or sumpner test of single phase transformer | Experiments | BL4-Analyze | |
| 5 | Scott connection | Experiments | BL3-Apply | |
| 6 | Constructional features of DC machine | Experiments | BL3-Apply | |
| 7 | Load test of DC shunt machine | Experiments | BL5-Evaluate | |
| 8 | Swinburne test | Experiments | BL3-Apply | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | Electric Machines, I.J. Nagrath & D.P. Kothari, 3/e, TMH<br>Electrical Machinery, P.S. Bhimbra, 6/e, Khanna Publishers<br>Electrical Machines, Ashfaq Husain, Dhanpat Rai & Co. (Pvt.) Ltd. |
| **Articles** | |
| **References Books** | Electric Machinery A.E. Fitggerald, C.Kingsley Jr and Umans 6th Edition McGraw Hill, International Student Edition<br>M.G. Say, “The Performance and Design of AC machines”, Pit man & Sons.<br>Electrical Technology Vol-II , B.L. Thareja |
| **MOOC Courses** | 1.Applied Linear Algebra for Signal Processing, Data Analytics and Machine Learning, Electrical Engineering, Prof. Aditya K. Jagannatha, IIT Kanpur<br>https://archive.nptel.ac.in/courses/108/104/108104174/ 2. Electrical Equipment and Machines: Finite Element Analysis Electrical Engineering Prof. Shrikrishna V. Kulkarni IIT Bombay https://archive.nptel.ac.in/courses/108/101/108101167/ |
| **Videos** | 1.https://www.youtube.com/playlist?list=PLuUdFsbOK_8qVROrfl2M2WSV2xAz-ABVU 2. https://www.youtube.com/watch?v=PGihCyWoVGE |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | - | 1 | - | - | 1 | 1 | 2 | 3 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO3 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO4 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Instrumentation |
| **Course Code** | EEL0430 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment 1 | Study of Multimeter & Measurement of Various Electrical quantity | Experiments | BL2-Understand | 2 |
| Experiment 2 | Calibration of Wattmeter with the help of Standard Voltmeter and Ammeter | Experiments | BL3-Apply | 2 |
| Experiment 3 | Measurement of Power and Power factor in a three phase circuit by two wattmeter method | Experiments | BL3-Apply | 2 |
| Experiment 4 | Calibration of Wattmeter with help of standard voltmeter and Ammeter | Experiments | BL3-Apply | 2 |
| Experiment 5 | Study and Measurement of insulation resistance using Megger. | Experiments | BL4-Analyze | 2 |
| Experiment 6 | Measurement of Medium resistance by Wheatstone bridge | Experiments | BL3-Apply | 2 |
| Experiment 7 | Measurement of Low Resistance by Kelvin Double Bridge | Experiments | BL3-Apply | 2 |
| Experiment 8 | Study of Potential Transformer & related measurements | Experiments | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Instrumentation |
| **Course Code** | EEL0430 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic measuring instruments and their units. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify the standard devices and galvanometers for the measurement of voltage and current.**(BL1-Remember)**<br>**CO2-** Construct the watt-meter and energy meter to measure power and energy.**(BL2-Understand)**<br>**CO3-** Construct instrumentation transformer to measure high values of current and voltage.**(BL3-Apply)**<br>**CO4-** Analyze the bridges for the measurement of low, medium and high resistance. **(BL4-Analyze)**<br>**CO5-** Analyze the bridges for the measurement of inductance and capacitance measurement;**(BL5-Evaluate)**<br>**CO6-** Construct the potentiometers to measure AC and DC values of unknown voltage**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Definition of analog & digital instruments, Classification of analog instruments, their operating principle, Operating force, Types of supports, Damping, Controlling. Theory & operation of D'arsonal galvanometer. Measurements: Measurement systems, methods of measurement, classification of instruments, Static and Dynamic Characteristics of the instruments, Errors in measurement, Classification of Errors and Error Calibration curve, Loading Effect due to shunt and series connected Instruments. | Talks and presentations | 12 |
| Unit 2 | Different types of Ammeter & Voltmeter: PMMC, MI, Electrodynamometer, Hotwire, Electrostatic, Induction, Rectifier & Electro-thermic, Expression for deflection torque, their advantages, disadvantages & error, Extension of range of instruments using shunt & multiplier | Talks and presentations | 14 |
| Unit 3 | Measurement of power: Power in AC and DC Circuit, Electrodynamometer type of wattmeter, Construction, theory, operation & error, Low power factor & UPF wattmeter, Double element and three element dynamometer wattmeter, Active & reactive power measurement in three phase circuits. Measurement of Energy: Single phase induction type energy meter – construction & operation – driving and braking torques –errors & compensations – Testing by phantom loading, Three phase energy meter. | Talks and presentations | 10 |
| Unit 4 | Miscellaneous Instruments & Measurements: Power factor meter, Single phase and three phase Electro-dynamometer type & moving iron type. Frequency meter – Vibrating reed, Resonance type & Weston type, Resistance Measurement – Classification of low, medium & high resistance – Voltmeter, Ammeter, Wheatstone Bridge, Kelvin's double bridge & loss of charge methods for resistance measurement, Earth resistance measurement, Megger. | Talks and presentations | 11 |
| Unit 5 | Instrument transformers: Potential and current transformers, ratio and phase angle errors, Difference between CT and PT, errors and reduction of errors. | Talks and presentations | 13 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Exp-1 | Study of Multimeter & Measurement of Various Electrical quantity | Experiments | BL2-Understand | 2 |
| Exp-2 | Calibration of Wattmeter with the help of Standard Voltmeter and Ammeter | Experiments | BL3-Apply | 2 |
| Exp-3 | Measurement of Power and Power factor in a three phase circuit by two wattmeter method | Experiments | BL5-Evaluate | 2 |
| Exp-4 | Calibration of Wattmeter with help of standard voltmeter and Ammeter | Experiments | BL3-Apply | 2 |
| Exp-5 | Study and Measurement of insulation resistance using Megger. | Experiments | BL5-Evaluate | 2 |
| Exp-6 | Measurement of Medium resistance by Wheatstone bridge | Experiments | BL5-Evaluate | 2 |
| Exp-7 | Measurement of Low Resistance by Kelvin Double Bridge | Experiments | BL5-Evaluate | 2 |
| Exp-8 | Study of Potential Transformer & related measurements | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | A.K. Sawhney Electrical & Electronic Measurements & Instrument Dhanpat Rai & Sons Pub |
| **Articles** | |
| **References Books** | 1.E W Golding & F C Widdis Electrical Measurement & Measuring Instruments Wheeler Pub |
| **MOOC Courses** | |
| **Videos** | 1.https://www.youtube.com/watch?v=7if7MSqiepg2 2.https://www.youtube.com/watch?v=h8BlWgE8bH0 3.https://www.youtube.com/watch?v=BOJqnvvWauE |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | 1 | - | 1 | 1 | 1 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO3 | 1 | - | 1 | 1 | - | 1 | 1 | - | - | 1 | 1 | - | 3 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electric and Hybrid Vehicles |
| **Course Code** | EEL0435 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of EV | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources**(BL1-Remember)**<br>**CO2-** Design and develop basic schemes of electric vehicles and hybrid electric vehicles**(BL2-Understand)**<br>**CO3-** Choose proper energy storage systems for vehicle application**(BL3-Apply)**<br>**CO4-** Identify various communication protocols and technologies used in vehicle networks**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Introduction to Hybrid Electric Vehicles: History of Hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance. | talks and presentation | 9 |
| II | Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis. | talks and presentation | 8 |
| III | Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives | talks and presentation, PBL | 9 |
| IV | Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power ,electronics, selecting the energy storage technology | talks and presentation, PBL | 8 |
| V | Communications, supporting subsystems: In vehicle networks- CAN, Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies | talks and presentation | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| III | Vector control of PMSM and IM drives over complete drive cycle of EV | Experiments | BL5-Evaluate | 2 |
| III | Characterization of power, torque and efficiency for EV over drive cycle | Experiments | BL5-Evaluate | 2 |
| II | Power flow in EV power train during charging, V2G feeding, motoring and braking | Experiments | BL4-Analyze | 2 |
| IV | Forward & backward motoring and regenerative braking of EV consisting of multiple motor- drives | Experiments | BL3-Apply | 2 |
| V | Synchronized PWM techniques for high-power and high-speed IM drives | Experiments | BL2-Understand | 2 |
| V | Working with the CAN communication | Experiments | BL2-Understand | 2 |
| I | Experiments on Type-I onboard charger | Experiments | BL6-Create | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1.Tom Denton, “Automotive Electrical and Electronic Systems”, 5th Edition, Routledge 2.Tom Denton, “Automotive Electrical and Electronic Systems”, 5th Edition, Routledge 3.Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003 |
| **Articles** | 1.E. Karden, S. Ploumen, B. Fricke, T. Miller and K. Snyder, “Energy storage devices for future hybrid electric vehicles,” J. Power Sources, vol. 168, no. 1, pp. 2–11, 2007 |
| **References Books** | 1.Berker B., James W. J. & A. Emadi, “Switched Reluctance Motor Drives”, CRC Press |
| **MOOC Courses** | 1.https://onlinecourses.nptel.ac.in/noc22_ee53/preview Electric Vehicles - Part 1 By Prof. Amit Jain \| IIT Delhi 2.https://nptel.ac.in/courses/108106170 Institute Logo NOC:Fundamentals of Electric vehicles: Technology & Economics, IIT Madras Prof. Ashok Jhunjhunwala Prof. Prabhjot Kaur Prof. Kaushal Kumar Jha Prof. L Kannan |
| **Videos** | 1.Berker B., James W. J. & A. Emadi, “Switched Reluctance Motor Drives”, CRC Press 2.Berker B., James W. J. & A. Emadi, “Switched Reluctance Motor Drives”, CRC Press 3.https://www.youtube.com/watch?v=CWulQ1ZSE3c |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | - | 2 | - | 1 | - | 1 | 1 | 1 | - | 1 | - | - |
| CO2 | - | - | 1 | 1 | - | 1 | - | - | 2 | - | - | - | - | - | 1 |
| CO3 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | 1 | - | - | - | 1 | - | - | - | 1 | - | 1 | - |
| CO5 | - | - | - | - | - | 1 | - | - | - | 1 | - | 1 | - | - | - |
| CO6 | - | - | 2 | - | - | - | - | 1 | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power Generation Transmission and Distribution |
| **Course Code** | EEL0441 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** understand the scenario and structure of power system**(BL1-Remember)**<br>**CO2-** set up the substation and its maintenance, power station maintenance **(BL2-Understand)**<br>**CO3-** the load flow, volume calculation of conductor and the components required in power system**(BL3-Apply)**<br>**CO4-** can evaluate the power generation value, transmission and distribution system capacity**(BL4-Analyze)**<br>**CO5-** create a business continuity plan**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Unit – 1 Sources of electrical Energy ,elementary idea of conventional and non conventional sources Basic features & Comparison of various power plants Structure of Electric power system major components of power systems , variable load on power stations, elementary idea of load curves, load duration curve, terminology of power engineering , Power system scenario in india | Talks and presentations | 15 |
| 2 | Transmission systems : Electric supply systems , comparison of AC & DC supply systems, advantages of high transmission voltage, Comparison of conducting material in underground supply system comparison of transmission elements of transmission line. Economic choice of conductor size, transmission voltage | Talks and presentations | 10 |
| 3 | Types of Conductors&Line Parameters: calculation of inductance Resistance and capacitance of single and double circuit transmission lines, three phase lines with stranded and bundle conductors, Skin Effect And Proximity Effect Generalized ABCD constants and equivalent circuits of short, medium & long lines. | Talks and presentations,Group discussions | 12 |
| 4 | Representation of power system components: single phase solution of balanced three phase Networks, the one line diagram or the impedance or reactance diagram, per unit system, complex power, representation of loads, characteristics and performance of a short medium and long transmission line, Ferranti effect , tuned power lines, power flow through a transmission line, methods of voltage control. | Talks and presentations | 11 |
| 5 | Mechanical Design of Transmission lines: different types of tower, sag calculation, string chart vibration dampers, line supports, spacing of conductors and ground, corona loss and its effects cables: classification, construction and characteristics, types, insulation resistance and capacitance, grading, laying, jointing. phenomenon of dielectric stress and sheath loss | talks and presentation | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Power System Engineering - Nagrath and Kothari |
| **Articles** | |
| **References Books** | Modem Power System Practice", Volume 1 to 8, Central Electricity Generating Board |
| **MOOC Courses** | 1.Power System Protection Electrical Engineering Prof. Ashok Kumar Pradhan IIT Kharagpur 2.Power System Protection and Switchgear Electrical Engineering Prof. Bhaveshkumar R. Bhalja IIT Roorkee 3. Power Transmission Systems Electrical Engineering Prof. Krishna S IIT Madras |
| **Videos** | 1.https://www.youtube.com/watch?v=zeSEFsR-jZA 2.https://www.youtube.com/watch?v=M8Y-1g47UpU 3.https://www.youtube.com/playlist?list=PL5TKV1tzb09lKvDmGWkJ8XtoxulLI8TF8 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 3 |
| CO3 | 1 | - | 1 | 1 | - | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 | 3 | 3 |
| CO5 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Microprocessors & Interfacing |
| **Course Code** | EEL0509 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Interdisciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** to understand the 8085 PROCESSOR and its architecture**(BL2-Understand)**<br>**CO2-** to understand the 8086 MICROPROCESSOR and its ARCHITECTURE **(BL2-Understand)**<br>**CO3-** to understand the INSTRUCTION SET OF 8086**(BL2-Understand)**<br>**CO4-** to understand INTERFACING DEVICEs**(BL2-Understand)**<br>**CO5-** to understand different INTERFACING AND APPLICATION OF 8085 MICROPROCESSOR **(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | THE 8085 PROCESSOR : Introduction to microprocessors, Overview, History of microprocessor. 8085 microprocessor: Architecture, instruction set, interrupts structure, and Assembly language programming. Timing Diagrams & simple examples, including loops & nested loops | Talks and presentations | 12 |
| 2 | THE 8086 MICROPROCESSOR ARCHITECTURE : Architecture, block diagram of 8086, details of sub-blocks such as EU, BIU; memory segmentation and physical address computations, program relocation, addressing modes, instruction formats, pin diagram and description of various signals | Talks and presentations | 13 |
| 3 | INSTRUCTION SET OF 8086 : Instruction execution timing, assembler instruction format, data transfer instructions, arithmetic instructions, branch instructions, looping instructions, NOP and HLT instructions, flag manipulation instructions, logical instructions, shift and rotate instructions, directives and operators, programming examples. | Talks and presentations | 11 |
| 4 | INTERFACING DEVICE : 8255 Programmable peripheral interface, interfacing keyboard and seven segment display, 8254 (8253) programmable interval timer, 8259A programmable interrupt controller, Direct Memory Access and 8237 DMA controller | Talks and presentations | 12 |
| 5 | INTERFACING AND APPLICATION OF 8085 MICROPROCESSOR : Interfacing issues, Interfacing ADC &DAC, Interfacing memory, Microprocessor-based voltage, current, frequency, power measurement schemes. | Talks and presentations | 12 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1. Microprocessor Architecture, Programming & Applications with 8085 : Ramesh S Gaonkar; Wiley Eastern Ltd. 2. The Intel Microprocessors 8086- Pentium processor : Brey; PHI |
| **Articles** | |
| **References Books** | REFERENCE BOOKS: 1. Microprocessors and interfacing : Hall; TMH 2. The 8088 & 8086 Microprocessors-Programming, interfacing,Hardware & Applications :Triebel & Singh; PHI 3. Microcomputer systems: the 8086/8088 Family: architecture, Programming & Design : Yu-Chang Liu & Glenn A Gibson; PHI. 4. Advanced Microprocessors and Interfacing : Badri Ram; TMH |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electromagnetic Field Theory |
| **Course Code** | EEL0510 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the basics of Understand electric and magnetic fields and apply the principles of Coulomb's Law and Gauss's law to electric fields in various coordinate systems**(BL1-Remember)**<br>**CO2-** Identify the electrostatic boundary-value problems by application of Poisson's and Laplace's equations**(BL2-Understand)**<br>**CO3-** Understand the depth of static and time-varying electromagnetic field as governed by Maxwell's equations.**(BL3-Apply)**<br>**CO4-** Formulate and analysis problems involving lossy media with planar boundaries using uniform plane waves.**(BL4-Analyze)**<br>**CO5-** Apply concepts of this subject in Antenna Engineering and its applications**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Cartesian Cylindrical Coordinates, Spherical Coordinates Vector Calculus: Differential Length, Area and Volume, line surface and volume integrals, del operator, gradient of a scalar, divergence of a vector and divergence theorem, curl of vector and Stoke's theorem, Laplacian of a scalar | Talks &Presentations | 10 |
| 2 | Electrostatic fields, Coulombs law and field intensity, Electric field due to charge distribution' Electric flux density, Gausses' Law-Maxwell's equation, Electric dipole and flux lines, energy density in electrostatic fields, boundary condition, Poisons and Laplace equations' . | Talks &Presentations | 12 |
| 3 | : Magneto-static fields, Biot-savart's Law, Ampere's circuit law, Maxwell's equation, application of ampere's law, magnetic flux density- Maxwell's equation, Maxwell's equation for static fields, magnetic scalar and vector potential, magnetic boundary conditions.. | Lectures,Talks &Presentations | 12 |
| 4 | Maxwell's equation, Faraday's law' transformer and motional electromotive forces, equation of continuity, displacement current, Maxwell's equation in final form. Electromagnetic wave propagation: Wave propagation in lossy dielectrics, plane waves in lossless dielectrics, plane wave in free space, plain waves in good conductors, power and the pointing vector, reflection of a plain wave in a normal incidence, wave polarization. | Talks &Presentations | 14 |
| 5 | Transmission line parameters, Transmission line equations. Lossless line, Distortion less line, Input impedance, Standing Wave Ratio and Power, The Smith chart, Some applications of transmission lines. | Talks &Presentations | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | 1. Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition 2. Basic Electrical Engg, Mittle&Mittle, TMH 3. Electronics Devices and Circuit Theory-Boylestad&Nashelsky, PHI. 4. Op Amps and Linear integrated Circuits, Ramakant A., Gayakwad, and Prentice Hall Publications. |
| **Articles** | |
| **References Books** | 1. Basic Electrical Engg, Sunil S Gaikwad, Dream Tech/ Willey Publication. 2. Hughes, Electrical and Electronic Technology, Pearson Education IX Edition. 3. Nagrath& Kothari, Basic Electrical Engineering, III Edition TMH. |
| **MOOC Courses** | 1.https://nptel.ac.in/courses/108106073 Electromagnetic Fields, IIT Madras Prof. Harishankar Ramachandran Coordinators: Prof. Harishankar Ramachandran Department of Electrical EngineeringIIT Madras |
| **Videos** | 1.https://www.youtube.com/watch?v=a7yGV-2NjCI 2.https://www.youtube.com/watch?v=LPnlqV5dGVI 3.https://www.youtube.com/watch?v=XoVW7CRR5JY |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 1 | 2 | 1 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | 1 |
| CO3 | 1 | 1 | 1 | 1 | - | 1 | - | - | - | - | 1 | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | 1 | 1 | - | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electric Vehicles Control |
| **Course Code** | EEL0536 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basics of vehicle mechanism | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To study about the motor & device characteristics & parameters.**(BL1-Remember)**<br>**CO2-** To know the various electric drive concepts**(BL2-Understand)**<br>**CO3-** To have a knowledge of DC drive mechanism.**(BL3-Apply)**<br>**CO4-** To have a knowledge of AC drive mechanism.**(BL4-Analyze)**<br>**CO5-** To understand about drives for special electrical machines**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Review of motor principles, motor load dynamics, starting, braking & speed control of dc and ac motors- power semiconductor SCRs, IGBTs and MOSFETs | talks and presentations | 8 |
| II | Basic drive, choice of electric drives, advantages, nature and classification of drives, control and stability of electric drives, feedback control of drives, thermal effects in electrical machines, selection of motor and rating. | talks and presentations | 8 |
| III | Transient analysis of separately excited dc motors, converter - single phase uncontrolled, half and fully controlled rectifiers, chopper control, closed loop control of solid-state DC drives | talks and presentations | 8 |
| IV | Operation of induction and induction motor, direct torque and flux control of induction motor drives, starting methods and speed control of single-phase induction motors, self-controlled synchronous motor drive, selection of motor and rating vector control of synchronous motor. | talks and presentations | 8 |
| V | Drives for variable reluctance motors, microprocessor/ microcontroller –gate trigger signal generation applications to special electrical machines, switched reluctance motor drives, brushless DC motor drives, permanent magnet drives. | talks and presentations | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Study of Device Characteristics, linear and switching operations : SCR, Triac, BJT, Mosfet and IGBT. Study of Protection circuits | Experiments | BL2-Understand | 2 |
| II | Study of any one Embedded platform (Atmel, STM32, Microchip, TI) for Basic Embedded operations (I/O processing, interrupt processing. | Experiments | BL3-Apply | 2 |
| III | MOSFET based Step up and step down converter for low voltage EV loops | Experiments | BL4-Analyze | 2 |
| III | Half and full bridge converter and role of control signals for DC moto | Experiments | BL4-Analyze | 2 |
| IV | Demonstrating both Current/Voltage loop control of DC motor | Experiments | BL5-Evaluate | 2 |
| V | Study of drive schemes and role of control signals for induction motor | Experiments | BL5-Evaluate | 2 |
| IV | Demonstrating Control of Induction motor | Experiments | BL4-Analyze | 2 |
| V | Demonstrating Control of BLDC /PMSM /SRM moto | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1.Gopal K D, “Fundamentals of Electric Drives”, Narosa Publishing House Pvt. Ltd., 2011. 2. Pillai S K, “A first course on Electrical Drives”, Wiley Eastern Ltd, Bombay 2011. |
| **Articles** | |
| **References Books** | 1.Ali Elamadi, “Handbook Automotive Power Electronics and Drives”, CRC publishers, 2012. 2. Bimal K Bose, “Modern Power Electronics and Drives”, Elsevier publishers, Butterworth Hinnemann, 2012. 3. Krishnan R, “Permanent Magnet synchronous and Brushless DC Motor Drives”, CRC Publishers, 2010. 4. Krishnan R, “Switched Reluctance Motor Drives: Modeling, Simulation, Analysis, Design and Applications”, CRC Publishers, 2012 |
| **MOOC Courses** | 1.https://onlinecourses.nptel.ac.in/noc22_ee53/preview 2.https://nptel.ac.in/courses/108106170 3. https://nptel.ac.in/courses/108106170 4. https://onlinecourses.nptel.ac.in/noc22_ee53 5. https://onlinecourses.nptel.ac.in/noc21_ee112 |
| **Videos** | 1.https://www.youtube.com/watch?v=nrxmQhbZUTc&t=100s 2.https://www.youtube.com/watch?v=6H5vtu5_SF4 |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 1 | - | 1 | - | 1 | - | - | 1 | - | - | - | - |
| CO2 | - | 2 | - | - | 1 | - | 1 | - | 1 | - | - | 1 | - | 1 | - |
| CO3 | - | 1 | 2 | - | - | - | - | - | - | 1 | - | - | 2 | - | - |
| CO4 | - | - | - | 2 | - | 2 | - | 2 | - | - | - | 2 | - | - | - |
| CO5 | 2 | - | 1 | - | 2 | - | 1 | - | 2 | - | 1 | - | - | - | 1 |
| CO6 | - | - | - | - | - | - | 3 | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power Electronics |
| **Course Code** | EEL0614 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Relate basic semiconductor physics to properties of power devices, and combine circuit mathematics and characteristics of linear and non-linear devices**(BL1-Remember)**<br>**CO2-** Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields.**(BL2-Understand)**<br>**CO3-** Formulate and analyze a power electronic design at the system level and assess the performance.**(BL4-Analyze)**<br>**CO4-** Acquire knowledge about different AC voltage controllers and their control.**(BL5-Evaluate)**<br>**CO5-** Study the basics of Cyclo converters. **(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Power diodes, Power Transistors, Power MOSFET, GTO, TRIAC, DIAC, IGBT, LASCR, MCTs, Construction and Principle of Operation of SCR, Static V-I Characteristics, Turn-on Methods, Two Transistor Analogy, Commutation Techniques, Firing circuits, Thyristor types rating and protection, Design of snubber circuit, Series and Parallel Operation of SCR. | Lectures | 11 |
| 2 | Rectifiers Operation and analysis of Single phase (Half wave and Full wave) controlled rectifier circuit with Resistive, Resistive- Inductive Load and RLE loads, Semi converter, Three phase half wave and full wave controlled converter, Dual Converter, Performance Parameters, Effect of freewheeling diode and source inductance on performance of these rectifier circuits. Comparison of midpoint and bridge rectifier circuits. | Talks and presentations | 12 |
| 3 | Choppers Principle of Chopper Operation, Various control strategies in chopper, Step up & step down choppers, Pulse width modulation, Frequency modulation, Chopper configuration (Type A,B,C,D & E), Voltage commutated Chopper, Multi- Phase Choppers. | Talks and presentations | 12 |
| 4 | Inverters Principle of operation of voltage source inverter, Single-phase Bridge Inverter, Three-Phase Inverters-180 o and 120 o Conduction Mode, Voltage Control in Single Phase Inverters, Modulation Techniques, Forced commutated thyristors, Current source inverter, Series and parallel inverter, Inverter applications. | Brainstorming,Talks and presentations | 13 |
| 5 | AC Voltage Controllers and Cyclo-Converters Principle of On-Off Control and Phase Control, Single-Phase Voltage Controller for Resistive and Resistive-Inductive Load, Principle of Cyclo-Converter, Single-Phase to Single-Phase Step-Up and Step-Down Cyclo-Converter, Three-Phase to Single-Phase and Three-Phase to Three-Phase Cyclo-Converter. | Talks and presentations, Guided Questioning | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2 | Implementation of rectifying circuit for mobile charging. | PBL | BL6-Create | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | | 60 | |

Part E

| | |
|---|---|
| **Books** | Rashid, M. H. (2011, January 1). Power Electronics: Circuits, Devices, and Application (for Anna University). Pearson Education India. http://books.google.ie/books?id=lfm1f57HVKcC&dq=Power+Electronics-Circuits,+Devices+and+Applications&hl=&cd=1&source=gbs_api<br>Erickson, R. W., & Maksimović, D. (2020, July 14). Fundamentals of Power Electronics. Springer Nature. http://books.google.ie/books?id=nhrxDwAAQBAJ&printsec=frontcover&dq=power+electronics&hl=&cd=2&source=gbs_api |
| **Articles** | |
| **References Books** | 1. Biswanath Paul: Industrial Electronics, PHI Learning. 2. T.E. Kissell: Industrial Electronics, PHI Learning. 3. P.C. Sen: Power Electronics. TMH Publisher. 4. Vedam Subramanyam: Power Electronics, New Age International. |
| **MOOC Courses** | 1.Power Electronics By Prof. Bhuvaneshwari \| IIT Delhi https://onlinecourses.nptel.ac.in/noc19_ee37/preview |
| **Videos** | 1.https://www.youtube.com/watch?v=W7D8sYwVbUA 2.https://www.youtube.com/watch?v=ZbvWe9xBu3Q&list=PLp6ek2hDcoND7i5-DAD9mPmYF1Wg6ROdO |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | 3 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO2 | 1 | 1 | 2 | 2 | 1 | 1 | - | - | 1 | - | - | - | 2 | 1 | 2 |
| CO3 | 2 | 2 | 3 | 1 | 1 | - | 2 | - | - | - | - | - | 2 | 1 | 3 |
| CO4 | 1 | 2 | 1 | 2 | 1 | - | - | 3 | - | - | 1 | - | 1 | 1 | 1 |
| CO5 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | 2 | 1 | 2 | 1 |
| CO6 | 1 | 1 | 2 | 1 | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power Electronics |
| **Course Code** | EEL0614 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 02 | 2 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | basic electrical and electronics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Describe the operation of power electronic devices and its applications.**(BL2-Understand)**<br>**CO2-** Analyze the I-V characteristics of SCR, DIAC and TRIAC. **(BL4-Analyze)**<br>**CO3-** Analyze the characteristics of MOSFET, IGBT and UJT.**(BL4-Analyze)**<br>**CO4-** Illustrate the functioning of rectifiers and firing circuits.**(BL5-Evaluate)**<br>**CO5-** Distinguish the speed control of DC motor using converters.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment No.1 | R&RC Firing Circuit. | Experiments | BL3-Apply | 2 |
| Experiment No.2 | Study of parallel inverter. | Experiments | BL4-Analyze | 2 |
| Experiment No.3 | Study of series inverter. | Experiments | BL4-Analyze | 2 |
| Experiment No.4 | SCR Characteristics. | Experiments | BL5-Evaluate | 2 |
| Experiment No.5 | DIAC Characteristics. | Experiments | BL4-Analyze | 2 |
| Experiment No.6 | TRIAC Characteristics. | Experiments | BL4-Analyze | 2 |
| Experiment No.7 | UJT Characteristics. | Experiments | BL5-Evaluate | 2 |
| Experiment No.8 | To draw drain characteristics. | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | 20 | | 30 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Vehicle Dynamics |
| **Course Code** | EEL0637 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the behavior of vehicle systems and subsystems, tires, drive train, gear boxes **(BL2-Understand)**<br>**CO2-** Use analysis and techniques learned in solid modeling and basic dynamics to develop computer models of linkages and complete working assemblies in two and three dimensions.**(BL3-Apply)**<br>**CO3-** Understand vehicle dynamics for use in design and performance of ground vehicles**(BL2-Understand)**<br>**CO4-** Transform solid models into dynamic models of vehicles for analysis of kinematics, (velocities and accelerations), kinetics (forces and moments).**(BL3-Apply)**<br>**CO5-** Vehicle parts and assemblies under impulsive impact forces and collisions. Simulations using dynamic Finite Element Analysis under dynamic loads**(BL2-Understand)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction, fundamental principles. vehicle tires performance, cornering characteristics Mechanics of Vehicle Terrain interaction. Introduction to Vehicle Design using SOLIDWORKS | Talks and presentations | 12 |
| 2 | Vehicle Kinematics. Fundamental principles of velocity, acceleration. Two dimensional mechanisms. Forward Vehicle Dynamics Multi-Body Systems Design. Three dimensional Dynamics. Mechanics of Vehicle Terrain interaction | Talks and presentations | 13 |
| 3 | Kinetics and Applied mechanisms. Forces and Moments in mechanisms. Application of fundamental laws of motion, energy and momentum to the design of vehicle mechanisms.Vehicle vibrations principles. Seat Belt Design Mathematical Models. Drive train dynamics, vehicle performance | Talks and presentations | 11 |
| 4 | Steering Mechanisms. Two and three-dimensional analysis. Mechanics of Vehicle Terrain interaction. Vehicle Collisions. Fundamental laws of motion, energy and momentum Forces and Moments 2D and 3D | Talks and presentations | 12 |
| 5 | The Dynamics of vehicle rollovers. NHTSA Computer Finite Element Modeling (FEA) and failure analysis Handling Characteristics of Road Vehicles Simulation Tests | Talks and presentations | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electric drives |
| **Course Code** | EEL0718 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | basic understanding of electrical machines | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To define electric drive, its parts, advantages and explain choice of electric drive. **(BL1-Remember)**<br>**CO2-** To explain dynamics and modes of operation of electric drives. **(BL2-Understand)**<br>**CO3-** To explain selection of motor power ratings and control of dc motor using rectifiers.**(BL3-Apply)**<br>**CO4-** To analyze the performance of induction motor drives under different conditions .**(BL4-Analyze)**<br>**CO5-** To explain the control of induction motor, synchronous motor and stepper motor drives.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Basic Concepts of Electric Drives Elements of drive systems, Requirement of electric drives, Rating & Selection of drives, groups and individual drives, Constant power and Constant torque drives. Motor Mechanism dynamics Review of Characteristics of AC & DC motors, load characteristic, load-drive speed torque characteristics, quadrant speed torque characteristics. Mechanical Systems Stability of Electric drives, referred moment of inertia and torque of motor load combination, load equalization. | Talks and presentations | 12 |
| 2 | DC Drives Starting & Braking of conventional, Phase controlled and chopper-controlled drives, Transient & Steady state analysis, Energy recovery systems. | Talks and presentations, Solution-based learning | 12 |
| 3 | Induction Motor Drives Conventional method of Starting braking and speed control, PWM, (VSI) Voltage source Inverter and Current Sources (CSI) fed IM drives, cyclo-converter fed drive, Vector control drives. Slip Controlled IM Drives Review of Conventional methods & converter controlled-Crammers & Scherbius drives; rotor impedance control. | Talks and presentations | 11 |
| 4 | Synchronous Motors Drives VSI and CSI fed; self-controlled-Brush less &. Commutator less dc & ac motor drives | Talks and presentations,Case studies | 13 |
| 5 | Special Drives: Fundamentals of Switched reluctance motors, Stepper Motors, Permanent Magnet Motor Introduction to vector control; Digital control of drives. Case Studies Electric traction, steel & cements plants, textile & paper mills, machine tool drive and CNC, electric cars. | Talks and presentations | 11 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | To explain dynamics and modes of operation of electric drives. | Experiments | BL3-Apply | 2 |
| II | To analyze the performance of induction motor drives under different conditions. | Experiments | BL4-Analyze | 2 |
| III | To explain the control of induction motor, synchronous motor and stepper motor drives. | Experiments | BL5-Evaluate | 2 |
| IV | To explain the control of induction motor, synchronous motor and stepper motor drives. | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | | 60 | |

Part E

| | |
|---|---|
| **Books** | 1 Dubey G. K., "Power Semiconductor Controlled Drives", PHI, 2 Dubey G. K. , "Fundamentals of Electrical Drives". Narosa Publishing House. 3 P.V. Rao, "Power semiconductor Drives", BS Publications |
| **Articles** | |
| **References Books** | 1. Pillai S. K. "A first course on Electrical Drives", Second edition, Wiley Eastern. 2. Murphy M. D., and Tumbuli F., "Power Electronic Control of AC Motors", Pergamon Press, Oxford University Press. 3. Ned Mohan Electrical Machine Drive WILEY INDIA. 4. Bose B. K., "Power Electronics and AC Drives", PHI Learning. 5. S.Shiva Nagaraju power semiconductor drive PHI learning |
| **MOOC Courses** | 1.https://archive.nptel.ac.in/courses/108/104/108104140/ 2.Fundamentals of Electric Drives, Electrical Engineering, Prof. Shyama Prasad Das,IIT Kanpur 3.Advanced Electric Drives, Electrical Engineering, Dr. S.P. Das, IIT Kanpur |
| **Videos** | 1.https://www.digimat.in/nptel/courses/video/108104140/L01.html 2.https://www.youtube.com/watch?v=QaLGo0R0SYU 3.https://www.youtube.com/watch?v=Ub-csHc4VhA 2. |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | 3 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO2 | 1 | 1 | 2 | 2 | 1 | 1 | - | - | 1 | - | - | - | 2 | 1 | 2 |
| CO3 | 2 | 2 | 3 | 1 | 1 | - | 2 | - | - | - | - | - | 2 | 1 | 3 |
| CO4 | 1 | 2 | 1 | 1 | 1 | - | - | 3 | - | - | 1 | - | 1 | 1 | 1 |
| CO5 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | 2 | 1 | 2 | 1 |
| CO6 | 1 | 1 | 2 | 1 | 1 | - | - | - | - | - | - | - | 2 | 3 | 1 |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electric drives |
| **Course Code** | EEL0718 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | To explain dynamics and modes of operation of electric drives. To explain selection of motor power ratings and control of dc motor using rectifiers To analyze the performance of induction motor drives under different conditions To explain the control of induction motor, synchronous motor and stepper motor drives. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To explain dynamics and modes of operation of electric drives. To explain selection of motor power ratings and control of dc motor using rectifiers To analyze the performance of induction motor drives under different conditions To explain the control of induction motor, synchronous motor and stepper motor drives**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment No.1 | Speed control of Induction Motor by V/F Method | Experiments | BL3-Apply | 2 |
| Experiment No.2 | Firing angle control of thyristor based dc drive connected to dc motor. | Experiments | BL5-Evaluate | 2 |
| Experiment No.3 | Closed loop speed control of dc motor using PID Controller. | Experiments | BL3-Apply | 2 |
| Experiment No.4 | Closed loop speed control of dc motor-generator set with load using PID controller. | Experiments | BL4-Analyze | 2 |
| Experiment No.5 | Step speed response of second order dc motor system. | Experiments | BL5-Evaluate | 2 |
| Experiment No.6 | Ramp speed response of second order dc motor system. | Experiments | BL6-Create | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | High Voltage Engineering |
| **Course Code** | EEL0738 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge about electrical machines | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various aspects of high voltage engineering.**(BL1-Remember)**<br>**CO2-** To understand Generation, Measurement and testing of high voltage.**(BL2-Understand)**<br>**CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)**<br>**CO4-** To analyze the different numeric problems for well understand subjects problems.**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the data using statistical & visualization tools.**(BL5-Evaluate)**<br>**CO6-** To prepare the models based on of real world problems of high voltage. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Generation of high voltages: Different methods of generation of direct current voltages, alternating current voltages and Impulse High Voltage, voltage doubler circuits, voltage multiplier circuits, cascade transformers, resonant transformers, tesla coil, multistage impulse generator | white board | 12 |
| Unit-2 | Measurement of high voltages: Different methods of measurement of direct current voltages, alternating current voltages and Impulse High Voltage, resistance potential dividers, generating voltmeters, series impedance voltmeters, series capacitance voltmeters, capacitance voltage transformer, electrostatic voltmeters, sphere gap method. | white board | 12 |
| Unit-3 | High Voltage Testing: Power frequency tests and impulse tests on Insulators bushings, short circuit tests on isolators and circuit breakers, dielectric power factor test and partial discharge measurement on cables, impulse testing of transformers. | white board | 12 |
| Unit-4 | Conduction and breakdown in vacuum, solid and liquid dielectrics: Concepts of electric stress, dielectric strength, breakdown in vacuum, liquids, solids, particle exchange mechanism, field emission theory, suspended particle theory, cavitation and bubble mechanism, stressed oil volume theory, solid dielectrics used in practice. | white board | 12 |
| Unit-5 | Applications of Insulating Materials: Applications in power transformers, rotating machines, circuit breakers, cables, power capacitors, high voltage bushings, fractional horse power motors. Insulation coordination on high voltage power systems, surge arresters. | white board | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | M.S. Naidu High Voltage Engineering Tata McGraw Hill, New Delhi |
| **Articles** | |
| **References Books** | C.L. Wadhwa High Voltage Engineering New Age International Ltd. Publisher, New Delhi.<br>Dr. M.P. Chourasia High Voltage Engineering Khanna Publisher Delhi.<br>E. Kuffel & W.S. Zaengl High Voltage Engineering Newnes , New Delhi. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 |
| CO2 | - | 3 | - | - | 1 | - | - | - | 1 | - | - | - | - | - | - |
| CO3 | - | - | 2 | - | - | - | 3 | - | - | 1 | - | - | 2 | - | - |
| CO4 | - | - | - | 1 | - | - | - | 4 | - | - | 2 | - | - | 1 | - |
| CO5 | - | - | - | - | - | 5 | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Utilization of electrical power |
| **Course Code** | EEL0822 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge about power system | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various aspects of utilization of power.**(BL1-Remember)**<br>**CO2-** To understand illumination, heating, welding , electrolysis and traction system.**(BL2-Understand)**<br>**CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)**<br>**CO4-** To analyze the different numeric problems for well understand subjects problems.**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the data using statistical & visualization tools;**(BL5-Evaluate)**<br>**CO6-** To prepare the models based on of real world problems utilization. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | ILLUMINATION ENGINEERING Nature of light, units, sensitivity of the eye, luminous efficiency, glares, Production of Light; Incandescent lamps, arc lamps gas discharge lamps, fluorescent lamps, polar curves, effect of voltage variation on efficiency and life of lamps, Distribution and control of light, lighting calculations, solid angle, inverse square and cosine laws, methods of calculations, factory lighting, flood lighting and street lighting, Direct diffused and mixed reflection & transmission factor, refractors, light fittings. | white board | 12 |
| Unit-2 | HEATING, WELDING AND ELECTROLYSIS I Electrical heating-advantages, methods and applications, resistance heating, design of heating elements, efficiency and losses control, Induction heating: core type furnaces, core less furnaces and high frequency eddy current heating, dielectric heating: principle and special applications, arc furnaces: direct arc furnaces, Indirect arc furnaces, electrodes, design of heating elements, power supply and control. | white board | 12 |
| Unit-3 | HEATING, WELDING AND ELECTROLYSIS II Different methods of electrical welding, resistance welding, arc welding, energy storage welding, laser welding, electro- beam welding, and electrical equipment for them, Arc furnaces transformer and welding transformers, Review of electrolytic principles., laws of electrolysis, electroplating, anodizing electro cleaning, extraction of refinery metals, power supply for electrolytic process, current and energy efficiency. | white board | 12 |
| Unit-4 | TRACTION Special features of Traction motors, Different system of electric traction and their Advantages and disadvantages, diesel electric locomotives, Mechanics of train movement: simplified speed time curves for different services, average and schedule speed, tractive effort, specific energy consumption, factors affecting specific energy consumption, acceleration and braking retardation, adhesive weight and coefficient of adhesion. | white board | 12 |
| Unit-5 | TRACTION MOTORS DC motors, single phases and three phases motors, starting and control of traction motors, braking of traction motors: plugging, rheostat and regenerative braking, Modern 25KV a.c. single phase traction systems: advantages, equipment and layout of 25 KV, line and current selection, single phase power frequency a.c. traction. | white board | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 5 | PLC based stepper motor for solar panel cleaning. | PBL | BL3-Apply | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | Tailor, E.O. Utilization of Elect. Energy The Orient Blackswan |
| **Articles** | |
| **References Books** | H. Pratap Art and Science of Utilization of Electrical Energy Bhandari Benevolent & Educational Society<br>Gupta, J.B. Utilization of Electrical Energy S.K. Kataria & Sons<br>Garg, G.C., Utilization of Elect. Power and Elect. Traction Khanna Books |
| **MOOC Courses** | Lecture Series on Illumination Engineering by Prof. N.K. Kishore, Department of Electrical Engineering,IIT Kharagpur. For more details on NPTEL visit http://nptel.iitm.ac.in |
| **Videos** | 1.https://www.youtube.com/watch?v=nMT7MzmG5ZA 2.https://www.youtube.com/watch?v=VnQ5fs1fIJA |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 2 | 2 | 1 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | - | 1 | 1 | 3 | 2 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | - | 3 | 3 | 3 |
| CO4 | 1 | 1 | 1 | 1 | - | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | - | - | 1 | 1 | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power system operation & Control |
| **Course Code** | EEL0839 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the concept of Optimal Power System Operation under various operating constraints.**(BL1-Remember)**<br>**CO2-** To know the importance of frequency control**(BL2-Understand)**<br>**CO3-** To analyze different methods to control reactive power**(BL3-Apply)**<br>**CO4-** To understand unit commitment problem and importance of economic load dispatch**(BL4-Analyze)**<br>**CO5-** To understand real time control of power systems **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | PRELIMINARIES ON POWER SYSTEM OPERATION AND CONTROL Power scenario in Indian grid – National and Regional load dispatching centers –requirements of good power system - necessity of voltage and frequency regulation – real power vs frequency and reactive power vs voltage control loops - system load variation, load curves and basic concepts of load dispatching - load forecasting - Basics of speed governing mechanisms and modeling - speed load characteristics - regulation of two generators in parallel. | Talks and presentations | 12 |
| Unit-2 | REAL POWER - FREQUENCY CONTROL - Load Frequency Control (LFC) of single area system-static and dynamic analysis of uncontrolled and controlled cases - LFC of two area system - tie line modeling – block diagram representation of two area system - static and dynamic analysis - tie line with frequency bias control – state variability model - integration of economic dispatch control with LFC. | Talks and presentations | 13 |
| Unit-3 | REACTIVE POWER – VOLTAGE CONTROL - Generation and absorption of reactive power - basics of reactive power control – Automatic Voltage Regulator (AVR) – brushless AC excitation system – block diagram representation of AVR loop - static and dynamic analysis – stability compensation – voltage drop in transmission line - methods of reactive power injection - tap changing transformer, SVC (TCR + TSC) and STATCOM for voltage control. | Talks and presentations | 11 |
| Unit-4 | ECONOMIC OPERATION OF POWER SYSTEM - Statement of economic dispatch problem - input and output characteristics of thermal plant - incremental cost curve - optimal operation of thermal units without and with transmission losses (no derivation of transmission loss coefficients) - base point and participation factors method - statement of unit commitment (UC) problem - constraints on UC problem – solution of UC problem using priority list – special aspects of short term and long term hydrothermal problems. | Talks and presentations | 14 |
| Unit-5 | COMPUTER CONTROL OF POWER SYSTEMS - Need of computer control of power systems-concept of energy control centers and functions – PMU - system monitoring, data acquisition and controls - System hardware configurations - SCADA and EMS functions - state estimation problem – measurements and errors - weighted least square estimation - various operating states - state transition diagram. | Talks and presentations | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment 1 | To study characteristics of solid state over voltage and under voltage relay | Experiments | BL2-Understand | 2 |
| Experiment 2 | To study characteristics of static type over current relay | Experiments | BL2-Understand | 2 |
| Experiment 3 | Under voltage relay static type | Experiments | BL3-Apply | 2 |
| Experiment 4 | To study IDMT Over current relays single phase and to determine the pick up and reset value | Experiments | BL4-Analyze | 2 |
| Experiment 5 | To study line to line fault | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1. Olle.I.Elgerd, 'Electric Energy Systems theory - An introduction', McGraw Hill Education Pvt. Ltd., New Delhi, 34th reprint, 2010. 2. Allen. J. Wood and Bruce F. Wollen berg, 'Power Generation, Operation and Control', John Wiley & Sons, Inc., 2016. 3. Abhijit Chakrabarti and Sunita Halder, 'Power System Analysis Operation and Control', PHI learning Pvt. Ltd., New Delhi, Third Edition, 2010. |
| **Articles** | |
| **References Books** | 1. Kothari D.P. and Nagrath I.J., 'Power System Engineering', Tata McGraw-Hill Education, Second Edition, 2008. 2. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 21st reprint, 2010. 3. Kundur P., 'Power System Stability and Control, McGraw Hill Education Pvt. Ltd., New Delhi, 10th reprint, 2010. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | 1 | 1 | - | - | 3 | - | - | - | - | 3 | 3 | 2 |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | 1 | - | - | 2 | 3 | - |
| CO3 | 1 | 3 | 1 | 2 | 1 | - | 1 | - | 1 | - | 1 | - | 2 | 2 | 3 |
| CO4 | 2 | 1 | 1 | - | - | 3 | - | 1 | - | - | 1 | - | 2 | 1 | - |
| CO5 | 2 | 3 | 3 | 2 | 1 | - | - | - | - | 1 | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Signal & Systems |
| **Course Code** | EEM0610 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** to understand Time and frequency domain analysis of systems**()**<br>**CO2-** to learn Laplace-Transform (LT) and Z-transform (ZT)**()**<br>**CO3-** to learn Fourier Transforms (FT)**()**<br>**CO4-** to understand different linear and nonlinear system**()**<br>**CO5-** to understand different signals**()** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Signals: Definition, types of signals and their representations: continuous-time/discrete-time, periodic/nonperiodic,even/odd,energy/power,deterministic/random,onedimensional/multidimensional; commonly used signals (in continuous-time as well as in discrete-time): unit impulse, unit step, unit ramp (and their interrelationships), exponential, rectangular pulse, sinusoidal; operations on continuous-time and discrete-time signals (including transformations of independent variables). | Talks and presentations | 12 |
| 2 | Laplace-Transform (LT) and Z-transform (ZT):One-sided LT of some common signals, important theorems and properties of LT, inverse LT, solutions of differential equations using LT, Bilateral LT, Regions of convergence (ROC) (ii) One sided and Bilateral Z-transforms, ZT of some common signals, ROC, Properties and theorems, solution of difference equations using one-sided ZT, s- to z-plane mapping. | Talks and presentations | 13 |
| 3 | Fourier Transforms (FT):Definition, conditions of existence of FT, properties, magnitude and phase spectra, Some important FT theorems, Parseval's theorem, Inverse FT, relation between LT and FT .Discrete time Fourier transform (DTFT), inverse DTFT, convergence, properties and theorems, Comparison between continuous time FT and DTFT. | Talks and presentations | 11 |
| 4 | Systems: Classification, linearity, time-invariance and causality, impulse response, characterization of linear time-invariant (LTI) systems, unit sample response, convolution summation, step response of discrete time systems, stability. convolution integral, co-relations, signal energy and energy spectral density, signal power and power spectral density, properties of power spectral density. | Talks and presentations | 12 |
| 5 | Time and frequency domain analysis of systems : Analysis of first order and second order systems, continuous-time (CT) system analysis using LT, system functions of CT systems, poles and zeros, block diagram representations; discrete-time system functions, block diagram representation, illustration of the concepts of system bandwidth and rise time through the analysis of a first order CT low pass filter. | Talks and presentations | 12 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Text Books: 1. P. Ramakrishna Rao, 'Signals and Systems' 2008 Ed., Tata McGraw Hill, New Delhi |
| **Articles** | |
| **References Books** | Reference Books: 1. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, 'Signals & System', Pearson Education, 2nd Ed., 2. Chi-Tsong Chen, `Signals and Systems', 3rd Ed., Oxford University Press, 2004 3. Hwei. P .Hsu, Signals and Systems, Schaum`s outlines, TMH. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | - | 2 | 2 | 2 |
| CO2 | 1 | - | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Computer Aided Protection |
| **Course Code** | EEM0611 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Storage Systems, Operating systems, Networking and Database | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember microprocessor based protection system**(BL1-Remember)**<br>**CO2-** To set up the digital protection systems for transformer, generator, transmission line and other devices**(BL2-Understand)**<br>**CO3-** To analyze and select the particular digital components for a particular protection requirement**(BL3-Apply)**<br>**CO4-** To evaluate the fault and tripping time of circuit in the fault case**(BL4-Analyze)**<br>**CO5-** To create a business continuity plan**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Microprocessors Based Protective Relays, Over current, Impedance, Directional, reactance, MHO, off -set MHO relays, interface for distance relays, based on - line protection of Generator and Transformer. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 12 |
| Unit 2 | Digital Protection, Static relays using digital techniques, Digital relaying algorithm, on-line digital protection of three phase EHV/UHV transmission system. Digital protection of Generator, Transformer, Digital protection for parallel transmission line. | Lectures with whiteboard/PPT, Recorded video/interactive videos, lab | 12 |
| Unit 3 | Recent Developments, Fuzzy set approach to fault type and its location, Neutral Network application to fault location, High Impedance fault detection techniques. Introduction to genetic algorithm. | Lectures with whiteboard/PPT, Recorded video/interactive videos, lab | 12 |
| Unit 4 | Review of Electromagnetic Relay, Design, aspect of relay, coordination of relay setting , performance of relay i. e. speed , reliability & transient performance, testing of D / C & distance relays. | Lectures with whiteboard/PPT, Recorded video/interactive videos, lab | 12 |
| Unit 5 | Static Relays. Protection, Comparators, amplitude and phase Comparators, phase splitting techniques, Vector product devices, multi input Comparators. Block diagram representation of static instantaneous, over current, inverse DTL, IDMTL O/C relays. Static protection schemes for line, Transformer and generator. | Lectures with whiteboard/PPT, Recorded video/interactive videos, lab | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Characteristics of solid state Over Voltage Relay. | Experiments | BL2-Understand | |
| 1 | To study the operation of a non-directional electro-mechanical type over current relay and hence to obtain its inverse time current characteristics. | Experiments | BL4-Analyze | |
| 1 | To Study the operation of static Under Voltage Relay | Experiments | BL4-Analyze | |
| 1 | To study the operation of Under Current Relay. | Experiments | BL4-Analyze | |
| 1 | To Study Three Phase ABCD Parameters as practical application in transmission lines | Experiments | BL4-Analyze | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | Sunil S Rao Switchgear and protection Khanna Publishers , New Delhi<br>Rabindranath and M Chander Switchgear and protection |
| **Articles** | |
| **References Books** | L.P.Singh, Digital Protection Wiley Eastern Ltd,<br>Badri Ram & D.N. Vishwakarma, Power system Protectin & Switchgear TMH Publishing Company Ltd. New Delhi<br>M.V. Deshpande Switchgear and Protection TMH Publishing Company Ltd. New Delhi |
| **MOOC Courses** | 1.Digital Protection of Power System Electronics & Communication Engineering Prof. Bhaveshkumar R. Bhalja IIT Roorkee 2.Power System Protection Electrical Engineering Prof. Ashok Kumar Pradhan IIT Kharagpur 3.:Power System Protection and Switchgear Electrical Engineering Prof. Bhaveshkumar R. Bhalja IIT Roorkee |
| **Videos** | 1.https://www.youtube.com/watch?v=NVglhdH6P4c 2.https://www.youtube.com/watch?v=_uoy5YV8C_8 |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO2 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | 1 | 1 | - | 3 | 3 | 2 |
| CO3 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO4 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 2 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Special Electrical machine & Design |
| **Course Code** | EEM0612 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, participant must have a basic understanding of AC Machines, DC Machines. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)**<br>**CO6-** Design overall dimensions of synchronous machine & cooling of synchronous generator**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Design of Synchronous Machine Features of construction of low speed and medium speed Machine, design consideration of turbo and water wheel alternators, output coefficient and choice of main dimensions, design of stator winding, and design of field systems, regulation, losses and efficiency, cooling systems. | Talks and presentations | 12 |
| Unit-2 | Design of 3 Phase Induction Motor: Design consideration of ac motors, calculation of main dimensions, design of stator winding, effect of air gap on performance. Rotor Design: Design of slip ring and squirrel cage rotor, components of leakage reactance, calculation of leakage reactance and its effect on the performance. | Talks and presentations, ,Brainstorming | 11 |
| Unit-3 | Design of single phase Induction motor: Calculation of main dimensions of stator, complete design of stator with its punching details, design of main and auxiliary winding, design of rotor, performance calculation of designed rotor and performance by equivalent circuit approach. | Talks and presentations | 13 |
| Unit-4 | Design of Electrical Equipments Design of choke, DC motor starter, Lifting magnets and other electromagnetic devices. | Talks and presentations, Case studies | 10 |
| Unit-5 | Computer Aided Design: Philosophy and economics of computer aided design, advantages limitations, analysis and synthesis methods, and selection of input data and design variables, flow charts for design of induction motor and synchronous machine. Optimization of design constrained and unconstrained optimization problem. | Talks and presentations | 14 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | Design and construction analysis of 3-phase squirrel cage Induction machine. | Experiments | BL2-Understand | 2 |
| Experiment-2 | Design and construction analysis of 3-phase slip ring Induction machine. | Experiments | BL2-Understand | |
| Experiment-3 | TO STUDY 3 PHASE TRANSFORMER & AUTOTRANSFORMER | Experiments | BL2-Understand | |
| Experiment-4 | Introduction to design of Dc shunt Machine. | Experiments | BL3-Apply | |
| Experiment-5 | Elementary analysis and design of synchronous machine through cut section model . | Experiments | BL4-Analyze | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | Deshpandey M.V Design of Electrical Machines PHI Learning |
| **Articles** | |
| **References Books** | Veinot Cyril G Computer Aided Design of Electrical Machinery Veinot Cyril G<br>Sharanugasundararn A., Gangadharan G., & Palani R. Electrical Machine Design Data Book Wiley Eastern Ltd., New Delhi |
| **MOOC Courses** | 1.Optimisation for Machine Learning: Theory and Implementation (Hindi) Computer Science and Engineering Prof. Pravesh Biyani IIT Madras 2.Electrical Equipment and Machines: Finite Element Analysis Electrical Engineering Prof. Shrikrishna V. Kulkarni IIT Bombay 3.Electrical Machines Electrical Engineering Prof. G.Bhuvaneshwari IIT Delhi |
| **Videos** | 1.https://www.youtube.com/watch?v=PGihCyWoVGE 2.https://www.youtube.com/watch?v=M-WOeclY9Vc 3.https://www.youtube.com/watch?v=UYRxK2huBOY<br>4.https://www.youtube.com/playlist?list=PL9s6YpaXIcJt1IeX3JV1z1j1E9JUi3bFj |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | - | - | - | 1 | - | - | - | - | - | - |
| CO2 | 1 | 1 | - | - | - | 2 | - | - | - | 1 | - | - | - | - | - |
| CO3 | 1 | - | 2 | 1 | 1 | - | 3 | - | - | - | 1 | - | - | - | 1 |
| CO4 | 1 | 1 | 1 | - | - | - | - | 4 | 1 | - | - | - | - | 4 | - |
| CO5 | - | - | - | 3 | - | - | - | - | - | - | - | 1 | - | - | - |
| CO6 | - | - | - | - | 1 | - | - | - | - | - | - | - | 5 | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | SCADA systems and applications |
| **Course Code** | EEM0713 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Introduction to SCADA and PLC**(BL2-Understand)**<br>**CO2-** to learn on SCADA system components**(BL2-Understand)**<br>**CO3-** to learn on SCADA Architecture**(BL2-Understand)**<br>**CO4-** to learn on SCADA Communication methods**(BL2-Understand)**<br>**CO5-** to learn on Operations and controls of interconnected power system**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to SCADA and PLC: SCADA: Data acquisition system, evaluation of SCADA, communication technologies, monitoring and supervisory functions. PLC: Block diagram, programming languages, Ladder diagram, Functional Block diagram, Applications, Interfacing of PLC with SCADA. | Talks and presentations | 12 |
| 2 | SCADA system components: Schemes, Remote Terminal Unit, Intelligent Electronic Devices, Communication Network, SCADA server | Talks and presentations | 13 |
| 3 | SCADA Architecture- Various SCADA Architectures, advantages and disadvantages of each system, single unified standard architecture IEC 61850 SCADA / HMI Systems. | Talks and presentations | 11 |
| 4 | SCADA Communication- Various industrial communication technologies- wired and wireless methods and fiber optics, open standard communication protocols. | Talks and presentations | 12 |
| 5 | Operation and control of interconnected power system- Automatic substation control, SCADA configuration, Energy management system, system operating states, system security, state estimation, SCADA applications Utility applications, transmission and distribution sector operation, monitoring analysis and improvement. Industries oil gas and water. Case studies, implementation, simulation exercises | Talks and presentations | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1. Stuart A Boyer: SCADA supervisory control and data acquisition. |
| **Articles** | |
| **References Books** | Reference Books: 2. Gordan Clark, Deem Reynders, Practical Modem SCADA Protocols. 3. Sunil S. Rao, Switchgear and Protections, Khanna Publication |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Calibration and testing of electrical equipments |
| **Course Code** | EEM0714 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Electrical measurements and measuring instruments | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Measurement standards and its units**(BL1-Remember)**<br>**CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)**<br>**CO3-** Calibration procedures and methods of calibration**(BL3-Apply)**<br>**CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)**<br>**CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**<br>**CO6-** To enable the students to think in terms of innovative ideas to improve the existing technology in the field of measurements in terms of accuracy, cost, durability and user friendliness**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Electricity Rules: Indian Electricity Rules, Indian Electricity Act, Electricity Supply Act. | Talks and presentations | 12 |
| Unit-2 | Standards: Study of Various Indian Standards codes for various important electrical equipments. | Talks and presentations | 12 |
| Unit-3 | Installation & Commissioning : Installation & Commissioning of outdoor Indoor electrical equipments like transformer, Motors, Switchgears, Panels, Relays, CT, PT, Ear thing etc. | Talks and presentations, PBL | 12 |
| Unit-4 | Testing: Testing of new & Old electrical installation as per IS of the following. Transformer, Cables, Insulating Oil, Protective relays, Circuit Breakers, CT, PT, Meters, Energy Meters, PVC insulated cables, High voltage Testing & Routing Test, Type test on above. | Talks and presentations, PBL. Case Study | 12 |
| Unit-5 | Calibration : Calibration of meters, Energy meters, Relays, Circuit breakers, & other Equipments as per IS specification. | Talks and presentations, PBL | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | M. Subbarao Installation Commissioning & testing of Electrical Engineering Equipments Khanna Pub. |
| **Articles** | |
| **References Books** | Jagdishlal Handbook of Electricity Laws Nanak Bhavan NewDelhi.<br>I.S. Codes Indian Standard codes, Indian Standard Institution Nanak Bhavan, NewDelhi |
| **MOOC Courses** | 1.Electrical Machines -I, Electrical Engineering, Dr. D.Kastha, IIT Kharagpur 2.Electrical Machines I, Electrical Engineering, Prof. G. Sridhara Rao, IIT Madras |
| **Videos** | 1.https://www.youtube.com/watch?v=Ex_K3kSPAx4 2.https://www.youtube.com/watch?v=gXviN1bXXP8 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - |
| CO2 | - | 2 | - | - | - | - | - | - | 1 | - | - | - | - | 5 | - |
| CO3 | - | - | 1 | - | - | 1 | - | 1 | - | - | - | 1 | - | - | - |
| CO4 | - | - | - | 1 | - | - | - | - | - | 1 | - | - | - | - | - |
| CO5 | - | - | - | - | 2 | - | - | - | - | - | - | - | 2 | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power system reliability |
| **Course Code** | EEM0715 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** to learn on industrial utilization methods**()**<br>**CO2-** to learn design of distribution system**()**<br>**CO3-** to learn on power quality and its overview**()**<br>**CO4-** to learn on different maintenance systems**()**<br>**CO5-** to learn on ISO 9000 and TQM**()** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Reliability of Engineering Systems Component reliability, Hazard models, Reliability of systems wit non-repairable components, series, Parallel, Series-Parallel, Parallel-series configurations. Non-series-parallel configurations, minimal tie-set, minimal cut-set and decomposition methods. Repairable systems, MARKOV process, Long term reliability, Power System reliability. | Talks and presentations | 12 |
| 2 | Reliability of Engineering Systems Reliability model of a generating unit, State space methods, Combing states, sequential addition method, Load modeling, Cumulative load model, merging of generation and load models, Loss of load probability, Percentage energy loss, Probability and frequency of failure, Operating reserve calculations. | Talks and presentations | 13 |
| 3 | Power Network Reliability Weather effect on transmission lines, Common mode failures, Switching after faults, three, state components, Normally open paths, Distribution system reliability. | Talks and presentations | 11 |
| 4 | Composite System Reliability Bulk Power supply systems, Effect of varying load, Inter connected systems, correlated and uncorrelated load Models, Cost and worth of reliability. | Talks and presentations | 12 |
| 5 | Reliability Improvement & Testing Proper Design simplicity, Component improvement Testing Plans, time censored & sequential reliability tests, accelerated life test, Environ mental test, Reliability estimations | Talks and presentations | 12 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1. M.V. Deshpande, “Electrical Power System Design” TMH, New Delhi 2. J.B. Gupta “Utilization of Electric Power & Electric Traction” Katson Publishing House 3. Math H.J. Bollen, “Understanding Power Quality Problems” IEEE Press,Standard Publishers & Distrubutior, Dehli |
| **Articles** | |
| **References Books** | 4. P. Gopalkrishnan & A.K. Banergy, “Maintenance and Spare Parts Management” PHI 5. Dr. K.C. Arora “Total Quality Management” S.K. Katariay & Sons, New Delhi |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 2 | 3 | 2 |
| CO4 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Energy Management & Audit |
| **Course Code** | EEM0716 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Describe the basics of energy management, energy demand management and energy auditing**(BL1-Remember)**<br>**CO2-** Understand the need and significance of energy audit and management and understand the concept of measuring instruments for energy auditing, defining, and examining the various characteristics of instruments.**(BL2-Understand)**<br>**CO3-** To understand efficient heat & electricity utilization, saving and recovery in different thermal and electrical system.**(BL3-Apply)**<br>**CO4-** Analyze energy consumption patterns and trends within an organization or system, evaluating the economic and environmental impacts of different energy management practices.**(BL4-Analyze)**<br>**CO5-** Assess and compare various renewable energy technologies and their potential integration into existing energy systems, making informed recommendations based on feasibility and sustainability criteria.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✓<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG7(Affordable and clean energy)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | General energy problem: Energy use patterns and scope for conservation, Energy Scenario: Commercial and Non-commercial energy resources, Primary & secondary energy resources, Load forecasting,. Energy needs of growing economy, Thermodynamics of Energy Conservation Energy Conservation Act-2001 and its features. | Talks and presentations | 12 |
| Unit-2 | Energy audit: Auditing and Targeting, Types of energy audit, Energy monitoring, Energy accounting and analysis, Energy conservation policy, Energy Auditing instruments, , Energy management system, Use of Artificial intelligence based techniques in EMS, Functions of energy managers. | Talks and presentations | 13 |
| Unit-3 | Energy efficient electric drives, Energy efficient motors, Energy Conservation in transportation system especially in electric vehicle, Energy recovery in thermal systems, waste heat recovery techniques, thermal insulation. Thermal energy audit in heating, ventilation and air conditioning qualities, Energy storage for power systems (Mechanical, Thermal, Electrical & Magnetic). | Talks and presentations | 11 |
| Unit-4 | Power factor improvement in power system Energy conservation by improvement of load factor, Energy conservation in different industries, e.g. Iron and Steel industry, Aluminum industry, Cement industry, Paper and Textile industry, Electrical Energy Conservation in building, heating and lighting and domestic gadgets. | Talks and presentations | 10 |
| Unit-5 | Demand side management Load management, Energy costs and two-part tariff, Restructuring of electric tariff from energy conservation consideration, Energy storage and Co-Generation, Payback period, Energy economics, Economic analysis depreciation method, time value of money, Evaluation method of projects, replacement analysis, inflation risk analysis. | Talks and presentations | 14 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Power Generation, Operation & Control, A.J. Wood and B.F. Wolenberg, John Wiley & Sons Ltd.<br>2. Patterns of Energy Use in Developing Countries by Desai, Wiley Eastern Ltd. |
| **Articles** | |
| **References Books** | 1. Electrical energy utilization and conservation -- S C Tripathi ,Tata McGraw Hills<br>2. Energy Conservation- Paul O Callagan- Pergamon Press |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 3 | 3 | 3 | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 1 | 2 | - | 3 | 2 | 3 | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 1 | 2 | - | 3 | 2 | 3 | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 1 | 2 | - | 3 | 2 | 3 | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 1 | 2 | - | 3 | 2 | 3 | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Power quality and industrial application |
| **Course Code** | EEM0717 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of power system and power electronics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various aspects of Power quality and industrial applications.**(BL1-Remember)**<br>**CO2-** To understand Industrial utilization, Power quality and maintenance.**(BL2-Understand)**<br>**CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)**<br>**CO4-** To analyze the different numeric problems for well understand subjects problems**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the data using statistical & visualization tools.**(BL5-Evaluate)**<br>**CO6-** To prepare the models based on of real world problems of power quality. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Industrial Utilization: Type of lighting scheme, Design of Lighting schemes, factory lighting, methods of lighting calculations, street lighting, flood lighting. | Talks and presentations | 12 |
| Unit-2 | Design of Distribution Systems: Development of a distribution plan, primary distribution design, secondary distribution design, planning and design of town electrification scheme, design of industrial distribution systems. | Talks and presentations | 12 |
| Unit-3 | Power Quality: Overview of Power quality, power quality & EMC standards, Overview of Reliability evaluation: Generation reliability, distribution reliability, Industrial Power Systems reliability. | Talks and presentations, field work | 12 |
| Unit-4 | Maintenance: An overview , role of maintenance in failure , design of maintenance system, need for maintenance planning , benefits of maintenance planning . Predictive maintenance, non destructive testing and diagnostic instruments, Safety management: Safety principle and guidelines, computers in maintenance and maintenance budget. | Talks and presentations, PBL, Case studies | 12 |
| Unit-5 | Introduction to ISO 9000 and TQM: History of Quality, Quality management, quality principles, total quality , total quality control, total quality management, ISO9000. | Talks and presentations | 12 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | M.V. Deshpande Electrical Power System Design TMH, New Delhi |
| **Articles** | |
| **References Books** | 1. J.B. Gupta Utilization of Electric Power & Electric Traction Katson Publishing House<br>Murphy M. D., and Tumbuli F Power Electronic Control of AC Motors Pergamon Press, Oxford University Press<br>Math H.J. Bollen Understanding Power Quality Problems IEEE Press, Standard Publishers & Distributor, Delhi |
| **MOOC Courses** | 1.Power Quality Electrical Engineering Prof. Bhim Singh IIT Delhi 2.Power Quality Improvement Technique Electrical Engineering Prof. Avik Bhattacharya IIT Roorkee 3.Power Quality in Power Distribution Systems Electrical Engineering Dr. Mahesh Kumar IIT Madras |
| **Videos** | https://www.youtube.com/watch?v=q4VjsHq4LOk https://www.youtube.com/watch?v=x_H3kqJR_YE |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 3 |
| CO2 | - | 1 | - | - | - | - | 1 | - | - | - | - | - | - | 1 | - |
| CO3 | - | - | 2 | 1 | - | - | - | - | 1 | - | - | 1 | - | - | - |
| CO4 | - | - | - | - | 2 | - | - | - | - | 1 | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | 3 | - | - | 1 | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | 2 | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Advanced power system protection |
| **Course Code** | EEM0718 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the various types of relays, comparators and their realization using static circuits.**(BL1-Remember)**<br>**CO2-** Understand the realization of over current, distance and differential relays using comparators.**(BL2-Understand)**<br>**CO3-** Realize the various dynamic characteristics of digital relays for protection of transmission lines, transformers**(BL3-Apply)**<br>**CO4-** Analyze different Protection schemes of bus bar and transmission lines.**(BL4-Analyze)**<br>**CO5-** Identify the new developments in Digital Protection.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG13(Climate action) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Protective Relays: Relaying review, characteristics and operating equations of relays.CT's and PT's differential relay, over-current relay, reverse power relay, distance relays, applications of relays. | Talks and presentations | 12 |
| Unit-2 | STATIC RELAYS: Introduction, advantages and disadvantages, classification logic ckts, smoothing circuits, voltage regulator square wave generator, time delay ckts level detectors, summation device, sampling circuit, zero crossing detector, output devices. COMPARATORS: Replica Impedance, mixing transformers, general equation of phase and amplitude comparator, realization of ohm, impedance and off set impedance characteristics, duality principle, static amplitude comparators, coincidence circuit, Hall effect devices, Magneto receptivity, zener diode phase comparator multi input comparators. | Talks and presentations | 13 |
| Unit-3 | Generator and transformer protection: Protective devices for system. Protective devices for stator, rotor, and prime mover of generator, percentage differential relays protection, three winding transformer protection, earth fault protection, generator Transformer unit protection | Talks and presentations | 11 |
| Unit-4 | Bus bar and transmission line protection: Distance protective schemes, directional wave detection relay. Phase compensation carrier protection. High impedance differential scheme, supervisory and check relay, Some features of 500 KV relaying protection. | Talks and presentations | 10 |
| Unit-5 | Modern trends in power system protection: Different types of digital and computer aided relays, Microprocessor based relays, auto-reclosing, frequency relays, under and over frequency relays, di/dt relays. Algorithms for transmission line, transformer & bus bar protection; out-of-step relaying Introduction to adaptive relaying & wide area measurements | Talks and presentations | 14 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Power System Protection and Switchgear, B.Ram – Tata Mc-Graw Hill Pub.<br>2. Switchgear and Protection, M.V.Deshpande - Tata Mc-Graw Hill Pub. |
| **Articles** | |
| **References Books** | 1. Power System Protection & Switchgear, Ravindra Nath, M.Chander, Willy P<br>2.Computer Relaying for power system, Arun Phadke, James Thorp, Johns W P |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 3 | - | - | - | - | - | - | - | - | - | 2 | 3 | - |
| CO2 | 3 | - | 2 | - | - | - | - | - | - | - | - | - | 2 | 3 | - |
| CO3 | 3 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO4 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | 3 | 3 | - |
| CO5 | 2 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | industrial instrumentation |
| **Course Code** | EEM0821 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic knowledge of Pressure, Sound, Flow, Temperature, Level, Humidity, Torque, Viscosity and Vibration measurements. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Describes the purpose of instrumentation in Industrial processes. **(BL1-Remember)**<br>**CO2-** Describes the working of RTD, Thermostats, and thermocouple.**(BL2-Understand)**<br>**CO3-** Describes the Bourdon tube, diaphragms and Bell gauges for pressure measurement and to employ flapper-nozzle assembly for differential pressure measurement.**(BL3-Apply)**<br>**CO4-** Describes the various flow and level measurement devices used for industrial purposes.**(BL4-Analyze)**<br>**CO5-** Elucidate the construction and working of various industrial devices used to measure pressure, sound and flow**(BL5-Evaluate)**<br>**CO6-** Illustrate measurement techniques for acceleration, vibration and density **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Review of different transducers, their characteristics, displacement, force, torque and speed measurement, measurement of different industrial processes, pressure measurement, flow measurement, temperature measurement. | Talks and presentations | 12 |
| Unit-2 | Pressure measurement: Different type of manometers, diaphragm gauges, bellow and force balance type sensors, bourdern gauge, piezoelectric, capacitive and inductive pressure pickups, Vacuum pressure measurements: Mcleod gauge, pirani gauge, thermocouple gauge, knudsen gauge, ionization calibration procedures. | Talks and presentations | 12 |
| Unit-3 | Flow measurement: Differential pressure flow meters, pitat tube, orifice, vanturi flow nozzle, hot wire flow meter, constant pressure drop, variable area meters (rotameter), turbine meters. Electromagnetic flow meters, ultrasonic flow meters, measurement of level, differiential pressure method, conductive and capacitive method, electrochemical method, use of radio scope for level measurement. | Talks and presentations, Cse study | 12 |
| Unit-4 | Temperature measurements: Different types of temperature transducers, RTDS, industrial type RTD sensor, laboratory grade platinum temperature thermometer, thermo resistance thermometer, thermisters temperature detectors, digital quartz crystal thermometer | Talks and presentations, Problem-based learning | 12 |
| Unit-5 | Displacement measurement: Linear variable displacement transducer, capacitive transducer. Force measurement: Hydraulic force meter, pneumatic force meter, electric force transducers, strain gauge load cell, inductor load cells. | Talks and presentations | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | B.C. Nakra & K.K. Instrumentation Measurement and Analysis by B.C. Nakra & K.K. Chaudhary (VII Edition). Chaudhary (VII Edition), Tata McGraw Hill Publishing Ltd., New Delhi.<br>1. Electrical Measurement and Measuring Instruments by A K sawhney (VII Edition), Dhanpat Rai & Co. Tata McGraw Hill Publishing Ltd., New Delhi. |
| **Articles** | |
| **References Books** | A K sawhney Electrical Measurement and Measuring Instruments by A K sawhney (VII Edition), Dhanpat Rai<br>D. Patranabis Principle of Industrial Instrumentation by Patranabis TMH , New Delhi.<br>J.B. Gupta A Course in Electronic & Electrical Measurements & Instrumentation Kataria Sons |
| **MOOC Courses** | 1.INSTART - Instrumentation Course https://www.udemy.com/course/instart-ic-training-course-chapter-1-basics/?couponCode=24T3MT53024 2.Instrumentation, Prof. Ashis Kumar Dutta, IIT Kharagpur |
| **Videos** | 1.https://www.youtube.com/watch?v=7if7MSqiepg 2.https://www.youtube.com/watch?v=BOJqnvvWauE 3.https://www.youtube.com/watch?v=h8BlWgE8bH0 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 1 | 2 | 3 | 2 |
| CO3 | 1 | 1 | 1 | - | 1 | - | 1 | - | - | - | 1 | - | 2 | 2 | 3 |
| CO4 | 1 | 1 | 1 | 1 | 1 | - | - | 1 | - | - | 1 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | EHV AC and DC Transmission |
| **Course Code** | EEM0822 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the concept and performance of EHV transmission line.**(BL1-Remember)**<br>**CO2-** Acquire the knowledge about the properties of bundled conductors**(BL2-Understand)**<br>**CO3-** Understand about the various conventional and advanced compensation devices.**(BL3-Apply)**<br>**CO4-** Understand the concept of HVDC Transmission and about the various scheme of converter station, 12 – pulse converter, converter unit, converter operation, fitters, reactive power source, ground return and ground electrode.**(BL4-Analyze)**<br>**CO5-** Understand the concept of how to control the HVDC link. Comparison between AC and DC transmissions Applications of HVDC transmission. Power modulation and power control of HVDC lines.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG7(Affordable and clean energy)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Constitution of EHV a.c. and d.c. links, Kind of d.c. links, Limitations and Advantages of a.c. and d.c. transmission, Principal application of a.c. and d.c. transmission, Trends in EHV a.c. and d.c.transmission, Power handling capacity. Converter analysis garetz circuit, Firing angle control, Overlapping. | Talks and presentations | 12 |
| Unit-2 | FACTS devices, basic types of controller, series controller, static synchronous series compensator(SSSC), thyristor-controlled series capacitor(TCSC), thyristor controlled series reactor(TCSR), shunt controller (STATCOM), static VAR compensator(SVC), series-series controller, combined series-shunt controller, unified power flow controller(UPFC), thyristor controlled phase shifting transformer(TCPST). | Talks and presentations | 13 |
| Unit-3 | Components of EHV d.c. system, converter circuits, rectifier and inverter valves, Reactive power requirements, harmonics generation, Adverse effects, Classification, Remedial measures to suppress, filters, Ground return. Converter faults & protection harmonics misoperation, Commutation failure, Multiterminal D.C. lines. | Talks and presentations | 10 |
| Unit-4 | Control of EHV d.c. system desired features of control, control characteristics, Constant current control, Constant extinction angle control. Ignition Angle control. Parallel operation of HVAC & DC system. Problems & advantages. | Talks and presentations | 11 |
| Unit-5 | Travelling waves on transmission systems, Their shape, Attenuation and distortion, effect of junction and termination on propagation of traveling waves. Over voltages in transmission system. Lightning, switching and temporary over voltages: Control of lighting and switching over voltages | Talks and presentations | 14 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | S. Rao,- “EHV AC & DC Transmission” Khanna pub. 2. Kimbark,-" HVDC Transmission” john willy & sons pub. 3. Arrillaga,- “HVDC Transmission”2nd Edition ,IEE londan pub. |
| **Articles** | |
| **References Books** | 4. Padiyar, -“HVDC Transmission” 1st Edition ,New age international pub. 5. T.K. Nagsarkar,M.S. Sukhiza, -“Power System Analysis”, Oxford University 6. Narain.G. Hingorani, l. Gyugyi-”Undustanding of FACTS concept and technology”, John Wiley & sons pub. 7.P.Kundur- “H.V.D.C. Transmission” McGraw Hill Pub. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - | 2 | - | - | 1 | 2 | - |
| CO2 | 2 | 3 | 1 | 2 | - | 1 | - | - | 1 | - | 2 | - | 3 | 2 | 2 |
| CO3 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | - | 3 | - | - | 2 | 1 | 3 |
| CO4 | 3 | 1 | 2 | 1 | - | - | - | - | 3 | - | - | - | 1 | 1 | 1 |
| CO5 | 3 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | - | 2 | - | - | 2 | 2 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Machine Learning |
| **Course Code** | EEO0701 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Linear Algebra and Statistics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of machine learning.**(BL1-Remember)**<br>**CO2-** To understand the basic concepts of machine learning, various machine learning models, Performance Evaluation techniques and how to improve the performance of the Machine Learning models.**(BL2-Understand)**<br>**CO3-** To implement various Machine Learning Models.**(BL3-Apply)**<br>**CO4-** To train & test machine Learning Models. **(BL4-Analyze)**<br>**CO5-** To evaluate the performance of Machine Learning Models.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Introduction: Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning Important concepts of machine learning: Parametric vs non-parametric models, the trade-off between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias-variance trade off, overfitting, model selection, no free lunch theorem. | Lecture Method/Video Clips | 12 |
| II | Linear Regression: Linear regression, estimating the coefficients, accessing the accuracy of coefficient estimates, accessing the accuracy of the model, multiple linear regression, qualitative predictors Classification: Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, Bayes' theorem of classification, LDA for p=1, LDA for p>1, quadratic discriminant analysis | Lecture Method/Video Clips/Simulation | 10 |
| III | Resampling Methods, Model Selection and Regularization: Cross- validation, leave-one-out crossvalidation, k-fold cross-validation, the bootstrap, subset selection, shrinkage methods, ridge and lasso regression, dimension reduction methods, principal components regression, partial least square. Tree Based Methods: Advantages and disadvantages of trees, regression Trees, classification trees, bagging, random forest, boosting. | Lecture Method/Video clip/Simulation | 12 |
| IV | Support Vector Machine: Maximum margin classifier, classification using a separating hyperplane, the maximal margin classifier, support vector classifier, support vector machines, classification with non-linear decision boundaries, support vector machine, one-versus-one classification, one- Versus many classification. | Lecture Method/Video Clips/Simulation | 10 |
| V | Unsupervised Learning and Reinforcement Learning: Principle component analysis, what are principal components, clustering methods, k- means clustering, hierarchical clustering, Independent component analysis, latent semantic indexing, Markov Models, Hidden Markov Models, Reinforcement Learning. | Lecture Method/Video | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Write a program to handle missing value for .csv file. | Experiments | BL5-Evaluate | 2 |
| 1 | Write a program to Pre-processing of data for.csv file. | Experiments | BL4-Analyze | 2 |
| 2 | Write a program to implement Logistics Algorithm for .csv file. | Experiments | BL5-Evaluate | 2 |
| 3 | Write a program to implement Decision Tree Algorithm for .csv file. | Experiments | BL5-Evaluate | 2 |
| 5 | Heart Disease Prediction | PBL | BL5-Evaluate | 20 |
| 4 | Brain Tumor Detection and Prediction System | PBL | BL5-Evaluate | 6 |
| 4 | Crop/Plant Disease Detection & Prediction System | PBL | BL6-Create | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Aurélien Géron Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems |
| **Articles** | B. D. Shivahare, S. Suman, S. S. N. Challapalli, P. Kaushik, A. D. Gupta and V. Bibhu, "Survey Paper: Comparative Study of Machine Learning Techniques and its Recent Applications," 2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM), Gautam Buddha Nagar, India, 2022, pp. 449-454, doi: 10.1109/ICIPTM54933.2022.9754206. |
| **References Books** | D. E. Goldberg Genetic Algorithms in Search, Optimization & Machine Learning Pearson |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc23_cs18/preview |
| **Videos** | https://www.youtube.com/watch?v=fC7V8QsPBec |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | - | - | 1 |
| CO2 | 3 | 2 | 1 | - | 3 | - | - | - | - | - | - | 2 | - | 1 | 2 |
| CO3 | 1 | - | 1 | - | 1 | - | - | - | - | - | - | - | - | 2 | 2 |
| CO4 | 2 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | 2 | - | - | - | - | - | - | 1 | - | - | - | 1 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Fundamentals of IoT and Sensors |
| **Course Code** | EEO0702 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 4 | IOT based Smart specs | PBL | BL6-Create | 30 |
| 2 | smart dustbin based on iot | PBL | BL6-Create | 30 |
| 1 | To familiarize with various sensors such as LM 35 Temperature Sensor, PIR Sensor, Soil Sensor, Thermistor Sensor. | Experiments | BL6-Create | 2 |
| 1 | To study characteristics of Platinum RTD (Resistance Temperature Detector) sensor | Experiments | BL6-Create | 2 |
| 1 | To study Characteristics of NTC Thermistor sensor. | Experiments | BL5-Evaluate | 2 |
| 1 | Study the Characteristics of K Type Thermocouple. | Experiments | BL6-Create | 2 |
| 1 | Study the characteristics of Pressure Transducer/ Sensor. | Experiments | BL6-Create | 2 |
| 2 | To make a touch sensor using 555 Timer IC on Breadboard | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | 1) Arshdeep Bahga and Vijay Madisetti Internet of Things – A Hand-on Approach Universities press, 2015 2) Shantanu Bhattacharya, A K Agarwal, Environmental, Chemical and Medical Sensors, Springer Nature Singapore Pvt. Ltd. 2018 |
| **Articles** | 10.1088/978-0-7503-2707-7ch1 |
| **References Books** | 1) Donald Norris, The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black, McGraw Hill Publication<br>Raj Kamal, Internet of Things, TMH, New Delhi. |
| **MOOC Courses** | https://courses.mooc.fi/org/uh-cs/courses/introduction-to-the-internet-of-things-mooc |
| **Videos** | http://www.iot-a.eu/public NPTEL Lectures for Introduction to IoT |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | - | 1 | 3 | 2 | 1 | 2 | 2 | 2 | - | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 2 | 2 | 3 | 2 | - | - | 2 | - | - | 2 | 1 | 3 | 2 | 2 |
| CO5 | - | - | - | - | 1 | 2 | - | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Soft computing Techniques |
| **Course Code** | EEO0703 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. S, Rajasekaran & G.A. Vijayalakshmi Pai, “Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & applications”, Prentice Hall of India Publication. 2. N.P.Padhy, “Artificial Intelligence and Intellegent Systems” Oxford University Press. |
| **Articles** | |
| **References Books** | 1. S.N. Sivanandam & S.N. Deepa, “Principles of Soft Computing”, Wiley Publications 2. Rich E and Knight K, “Artificial Intelligence”, TMH, New Delhi. 3. Bose, “Neural Network fundamental with Graph” , Algo.& Appl, TMH 4. Kosko, “Neural Network & Fuzzy System”, PHI Publication |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | 1 | - | 2 | - | - | - | 3 | 3 | - |
| CO2 | 3 | 1 | - | 2 | - | - | - | - | - | 1 | - | - | 3 | 3 | 3 |
| CO3 | 1 | 3 | 3 | 2 | 1 | - | - | 1 | 1 | - | - | - | 2 | - | 2 |
| CO4 | 2 | - | - | 2 | - | - | 1 | 1 | - | - | - | - | 2 | 3 | 2 |
| CO5 | 2 | 1 | 2 | - | 3 | - | - | - | 2 | - | - | - | 3 | 2 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Engineering Simulation Lab I |
| **Course Code** | EEP 0502 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | Verification of Network Theorems i) Superposition theorem. ii) Thevenin's theorem. iii) Maximum power transfer theorem. | Experiments | BL2-Understand | 2 |
| Experiment-2 | Transient responses of series RLC, RL, RC circuits with Sine and Step inputs. | Experiments | BL3-Apply | 2 |
| Experiment-3 | Series and Parallel resonance. | Experiments | BL4-Analyze | 2 |
| Experiment-4 | Bode plot, Root-locus plot and Nyquist plot | Experiments | BL5-Evaluate | 2 |
| Experiment-5 | Transfer function analysis of i) Time response of step input ii) Frequency response for sinusoidal input. | PBL | | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1- | - | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Electrical Engineering Simulation Lab -II |
| **Course Code** | EEP 0603 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | Design of lag, lead and lag-lead compensators. | Experiments | BL2-Understand | 2 |
| Experiment-2 | Load flow studies. | Experiments | BL3-Apply | 2 |
| Experiment-3 | Fault analysis. | Experiments | BL4-Analyze | 2 |
| Experiment-4 | Transient stability studies. | Experiments | BL5-Evaluate | 2 |
| Experiment-5 | Economic power scheduling | Experiments | BL6-Create | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Industrial Training-I |
| **Course Code** | EET0302 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG4(Quality education)<br>SDG5(Gender equality)<br>SDG7(Affordable and clean energy)<br>SDG10(Reduced inequalities)<br>SDG11(Sustainable cities and economies)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | MPEB | Field work | BL3-Apply | 40 |
| 2 | Railways, Gwalior Office | Field work | BL3-Apply | 40 |
| 3 | BHEL | Field work | BL3-Apply | 40 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 3 | 3 |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Industrial Training-II |
| **Course Code** | EET0503 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 4 | 4 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG7(Affordable and clean energy) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | MPEB, Madhya Pradesh | Field work | BL3-Apply | 40 |
| 2 | NTPC | Field work | BL3-Apply | 40 |
| 3 | BHEL | Field work | BL3-Apply | 40 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 28 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 1 | 3 | 2 | 2 |
| CO2 | 1 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 2 |
| CO3 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | 2 | 3 | 2 |
| CO4 | 1 | 1 | - | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 3 |
| CO5 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | 1 | 1 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Industrial training-III |
| **Course Code** | EET0704 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 4 | 4 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Calculus For Engineers |
| **Course Code** | MAL0101[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 5 | 3 | 2 | 10 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Functions, Limit, Continuity and Differentiability | | | **Co-Requisite/s** | Basic knowledge of variables | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)**<br>**CO6-** Design overall dimensions of synchronous machine & cooling of synchronous generator**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to MATLAB through matrices, and general Syntaxes. | Experiments | BL3-Apply | 2 |
| 2 | Plotting and visualizing curves and surfaces in MATLAB– Symbolic computations using MATLAB | Experiments | BL3-Apply | 2 |
| 3 | Evaluating Extremum of a single variable function | Experiments | BL3-Apply | 2 |
| 4 | Understanding integration as Area under the curve | Experiments | BL3-Apply | 2 |
| 5 | Evaluation of Volume by Integrals (Solids of Revolution ) | Experiments | BL3-Apply | 2 |
| 6 | Evaluating Maxima and minima of functions of several variables | Experiments | BL3-Apply | 2 |
| 7 | Evaluating triple integrals | Experiments | BL3-Apply | 2 |
| 8 | Evaluating gradient, curl and divergence | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | 1. Thomas' Calculus by George B. Thomas, D. Weirand J. Hass, 13th edition 2014, Pearson. 2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 3. B.V. Ramana, Higher Engineering Mathematics, Tata Mc Graw Hill. |
| **Articles** | |
| **References Books** | 1. E. Kreyszig, Advanced Engineering Mathematics, 8th Ed., John Wiley and Sons, 1999. 2. Gorakhprasad, Integral Calculus, Pothishala Publication. 3. Gorakhprasad, Differential Calculus, Pothishala Publication. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ee09/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ph02/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 3 |
| CO2 | 2 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 3 |
| CO3 | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | 3 |
| CO4 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 |
| CO5 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Calculus For Engineers |
| **Course Code** | MAL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 5 | 3 | 2 | 10 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Functions, Limit, Continuity and Differentiability | | | **Co-Requisite/s** | Basic knowledge of variables | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)**<br>**CO6-** Design overall dimensions of synchronous machine & cooling of synchronous generator**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to MATLAB through matrices, and general Syntaxes. | Experiments | BL3-Apply | 2 |
| 2 | Plotting and visualizing curves and surfaces in MATLAB– Symbolic computations using MATLAB | Experiments | BL3-Apply | 2 |
| 3 | Evaluating Extremum of a single variable function | Experiments | BL3-Apply | 2 |
| 4 | Understanding integration as Area under the curve | Experiments | BL3-Apply | 2 |
| 5 | Evaluation of Volume by Integrals (Solids of Revolution ) | Experiments | BL3-Apply | 2 |
| 6 | Evaluating Maxima and minima of functions of several variables | Experiments | BL3-Apply | 2 |
| 7 | Evaluating triple integrals | Experiments | BL3-Apply | 2 |
| 8 | Evaluating gradient, curl and divergence | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 18 | 40 | 22 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | 1. Thomas' Calculus by George B. Thomas, D. Weirand J. Hass, 13th edition 2014, Pearson. 2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers. 3. B.V. Ramana, Higher Engineering Mathematics, Tata Mc Graw Hill. |
| **Articles** | |
| **References Books** | 1. E. Kreyszig, Advanced Engineering Mathematics, 8th Ed., John Wiley and Sons, 1999. 2. Gorakhprasad, Integral Calculus, Pothishala Publication. 3. Gorakhprasad, Differential Calculus, Pothishala Publication. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ee09/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ph02/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 3 |
| CO2 | 2 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | - | 2 | 3 |
| CO3 | 2 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | 1 | 3 |
| CO4 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 |
| CO5 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Statistics For Engineers |
| **Course Code** | MAL0203 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | statistics for engineers typically include basic mathematics (algebra, calculus), understanding of probability theory, and familiarity with concepts in engineering disciplines. Additionally, knowledge of software tools like MATLAB or Python for data analysis is beneficial. | | | **Co-Requisite/s** | statistics for engineers may include introductory courses in engineering mechanics, computer programming, and experimental methods. Additionally, concurrent enrollment in courses covering linear algebra and differential equations could provide valuable mathematical background for understanding advanced statistical concepts and applications in engineering contexts. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction: Understanding Data types; importing/exporting data. | Experiments | BL2-Understand | 2 |
| 2 | Computing Summary Statistics/plotting and visualizing data using Tabulation and Graphical Representations. | Experiments | BL3-Apply | 2 |
| 3 | Applying correlation and simple linear regression model to real dataset; Computing and interpreting the coefficient of determination | Experiments | BL3-Apply | 2 |
| 4 | Applying multiple linear regression model to real data set; computing and interpreting the multiple coefficient of determination | Experiments | BL3-Apply | 2 |
| 5 | Fitting the following probability distributions: Binomial distribution, | Experiments | BL3-Apply | 2 |
| 6 | Normal distribution Poisson distribution | Experiments | BL3-Apply | 2 |
| 7 | Testing of hypothesis for One sample mean and proportion from real, time problems | Experiments | BL3-Apply | 2 |
| 8 | Testing of hypothesis for Two sample mean and proportion from real, time problems | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | M. Ray, H.S. Sharma, Sanjay Chaudhary Mathematical Statistics Ram Prasad & Sons<br>J.N. Sharma, J.K. Goyal Mathematical Statistics Krishna Prakash and Media (P) Ltd |
| **Articles** | |
| **References Books** | E.Kreyszig Advanced Engineering Mathematics 8 th Ed., John Wiley and Sons, 1999<br>B.V. Ramana Higher Engineering Mathematics Tata McGraw Hill<br>B. S. Grewal Higher Engineering Mathematics Khanna Publishers |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ec03/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ec03/preview |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | 1 | - | - | - | - | 1 | - | 1 |
| CO2 | 3 | 3 | 1 | 3 | 3 | 2 | - | 1 | - | 1 | - | - | 2 | - | 2 |
| CO3 | 3 | 2 | - | 1 | 3 | - | - | - | - | - | - | - | 1 | 3 | 2 |
| CO4 | 3 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | 3 | 1 |
| CO5 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | - | - | 2 | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Engineering Mathematics |
| **Course Code** | MAL0306 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of equations | | | **Co-Requisite/s** | Basic knowledge of roots | | | |
| **Course Outcomes & Bloom's Level** | | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | 1. B.V.Ramana, Higher Engineering Mathematics, Tata McGraw Hill 2. B.S.Grewal, Higher Engineering Mathematics ,Khanna Publishers 3. H.K.Das and R. Verma, Higher Engineering Mathematics, S.Chand and Company Pvt.Ltd. |
| **Articles** | |
| **References Books** | 1. E.Kreyszig, Advanced Engineering Mathematics ,John Wiley and Sons, 1999 2. M.K.Jain, S.R.K.Iyengar and R.K.Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers. 3. T. Veerajan and T. Ramachandran, Theory and Problems in Numerical Methods, Tata McGraw Hill |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_ma36/preview |
| **Videos** | https://onlinecourses.nptel.ac.in/noc24_ma36/preview |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | - | - | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | - | - | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Engineering Mechanics |
| **Course Code** | MEL0101[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | 1. To verify the law of Triangle of forces and Lami's theorem. | Experiments | BL3-Apply | 2 |
| Experiment-2 | 2. To verify the law of parallelogram of forces | Experiments | BL3-Apply | 2 |
| Experiment-3 | 3. To verify law of polygon of forces | Experiments | BL3-Apply | 2 |
| Experiment-4 | 4. To find the support reactions of a given truss and verify analytically. | Experiments | BL3-Apply | 2 |
| Experiment-5 | 5. To determine support reaction and shear force at a given section of a simply supported beam and verify in analytically using parallel beam apparatus. | Experiments | BL3-Apply | 2 |
| Experiment-6 | 6. To verify bending moment at a given section of a simply supported beam. | Experiments | BL3-Apply | 2 |
| Experiment-7 | 7. To find coefficient of friction on horizontal and inclined planes. | Experiments | BL3-Apply | 2 |
| Experiment-8 | 8. To determine centre of gravity of different shapes. | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Engineering Mechanics by Dr. D.S. Kumar, S.K. Kataria & sons, latest edition. Engineering Mechanics by R. K. Rajput, S.Chand & Co. Engineering Mechanics: Statics & Dynamics by R.C. Hibbler |
| **Articles** | |
| **References Books** | • Engineering Mechanics- statics dynamics by Boresi & Schmidt, Thomson Books • Engineering Mechanics - Schaum's series - Mc.Grawhill Publications. • Engineering Mechanics by S. Timashenko, D.H. Young and J.V. Rao |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106286/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | - | 1 | 3 | - | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | - | 1 | 2 | 1 | 1 | 1 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Engineering Mechanics |
| **Course Code** | MEL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | 1. To verify the law of Triangle of forces and Lami's theorem. | Experiments | BL3-Apply | 2 |
| Experiment-2 | 2. To verify the law of parallelogram of forces. | Experiments | BL3-Apply | 2 |
| Experiment-3 | 3. To verify law of polygon of forces | Experiments | BL3-Apply | 2 |
| Experiment-4 | 4. To find the support reactions of a given truss and verify analytically. | Experiments | BL4-Analyze | 2 |
| Experiment-5 | 5. To determine support reaction and shear force at a given section of a simply supported beam and verify in analytically using parallel beam apparatus. | Experiments | BL4-Analyze | 2 |
| Experiment-6 | 6. To verify bending moment at a given section of a simply supported beam. | Experiments | BL4-Analyze | 2 |
| Experiment-7 | 7. To find coefficient of friction on horizontal and inclined planes. | Experiments | BL4-Analyze | 2 |
| Experiment-8 | 8. To determine centre of gravity of different shapes | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | 28 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | Engineering Mechanics by Dr. D.S. Kumar, S.K. Kataria & sons, latest edition. Engineering Mechanics by R. K. Rajput, S.Chand & Co. Engineering Mechanics: Statics & Dynamics by R.C. Hibbler |
| **Articles** | |
| **References Books** | • Engineering Mechanics- statics dynamics by Boresi & Schmidt, Thomson Books • Engineering Mechanics - Schaum's series - Mc.Grawhill Publications. • Engineering Mechanics by S. Timashenko, D.H. Young and J.V. Rao |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | - | 1 | 3 | - | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | - | 1 | 2 | 1 | 1 | 1 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-ElectricalEngineering

| | |
|---|---|
| **Title of the Course** | Engineering Graphics |
| **Course Code** | MEL0202 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of geometrical construction, sketching, imagination etc. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Classify & select proper material for the design of an electrical machine **(BL1-Remember)**<br>**CO2-** Design overall transformer**(BL2-Understand)**<br>**CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)**<br>**CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)**<br>**CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Drawing sheet of plane scale. | Experiments | BL3-Apply | 2 |
| Experiment -2 | Drawing sheet of diagonal scale. | PBL | BL3-Apply | 2 |
| Experiment -3 | Drawing sheet of ellipse. | PBL | BL3-Apply | 2 |
| Experiment -4 | Drawing sheet parabola and hyperbola | PBL | BL3-Apply | 2 |
| Experiment -5 | Drawing sheet of cycloidal curves. | | BL3-Apply | 2 |
| Experiment -6 | Drawing sheet of orthographic projection | | BL3-Apply | 2 |
| Experiment -7 | Drawing sheet of projection of line | | BL3-Apply | 2 |
| Experiment -8 | Drawing sheet of projection of plane. | | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. N.D.Bhatt Elementary of Enginnering Drawing Charotar Publication<br>P.S. Gill Engineering Drawing Kataria Publication<br>Agrawal and Agrawal Engineering Drawing TMH |
| **Articles** | |
| **References Books** | Venu Gopal K Engineering Drawing New age<br>K.L. Narayana& P. Kannaiah Engineering Drawing SCITECH Pub. |
| **MOOC Courses** | https://nptel.ac.in/courses/112103019 |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 2 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | - | - | 2 | 1 | 1 | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Manufacturing Technology –II |
| **Course Code** | MEL 0341[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Material science and manufacturing process. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To get the fundamentals of various metal forming operations.**(BL1-Remember)**<br>**CO2-** To understand the mechanism of metal forming.**(BL2-Understand)**<br>**CO3-** To implement the different metal forming operations to deform the parts.**(BL3-Apply)**<br>**CO4-** To analyze the different parameters used in metal forming.**(BL4-Analyze)**<br>**CO5-** To evaluate different forces which act during the operations.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Fundamentals of Metal Forming Importance of manufacturing, Materials and their structures, Mechanical behavior of crystalline materials, elastic and plastic deformation, yield criteria, Concept of flow stress, hot working and cold working, Metallurgical aspects of metal forming, effects of temperature, classification of metal forming processes, Heat treatment processes, Effect of heat treatment in metal forming processes. | Lectures with whiteboard/PPT , Quiz, Group discussion | 8 |
| Unit 2 | Forging: Forging principle, classification, equipment, tooling-processes, Forging operations, post forging heat treatment forging defects & applications, Forgeability, Comparison of forging with other manufacturing processes. Rolling: Scope and importance of rolling, Principles of rolling processes, classification, types of rolling mills, analysis of rolling load, torque and power, Form rolling, rolling defects, causes and remedies. | Lectures with whiteboard/PPT , Quiz, Group discussion | 9 |
| Unit 3 | Extrusion and Drawing: Classification of extrusion processes, tool, equipment, and principle of these processes, Extrusion dies, Extrusion load analysis, defects and remedies, rod/wire drawing, tool, equipment and principle of processes, defects, Tube drawing and sinking processes. Unconventional Metal Forming Process: Unconventional metal forming process such as explosive forming, electromagnetic, electro- hydraulic forming. | Lectures with whiteboard/PPT , Quiz, Group discussion | 7 |
| Unit 4 | Sheet metal forming: Presses and their classification, die and punch assembly and press work methods and process, formability of sheet metals- principle, process parameters, equipment and application of the following processes: deep drawing, spinning, stretch forming. cutting/punching mechanism, blanking versus piercing, compound and progressive die, coining, embossing etc. | Lectures with whiteboard/PPT , Quiz, Group discussion | 6 |
| Unit 5 | Powder Metallurgy Powder metallurgy manufacturing process, preparation of powders, types & function of binders, green compaction, sintering process and its effect on the product, advantages and application of powder metallurgy products. | Lectures with whiteboard/PPT , Quiz, Group discussion | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment 1 | To study of forging process. | Experiments | BL2-Understand | 2 |
| Experiment 2 | To perform the forging operations. | Experiments | BL5-Evaluate | 2 |
| Experiment 3 | To study of hammer forging. | Experiments | BL2-Understand | 2 |
| Experiment 4 | To study of rolling process. | Experiments | BL2-Understand | 2 |
| Experiment 5 | To study of extrusion and drawing process. | Experiments | BL2-Understand | 2 |
| Experiment 6 | To study of sheet metal working. | Experiments | BL2-Understand | 2 |
| Experiment 7 | To perform the sheet metal forming operations. | Experiments | BL5-Evaluate | 2 |
| Experiment 8 | To making a tray from the given sheet metal. | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Ghosh and Mallick Manufacturing Science East West Press, 2010<br>R. K. Jain Production Technology Khanna Publishers, 2001 |
| **Articles** | |
| **References Books** | P. C. Pandey Production Engineering Science Standard Publishers, 2010<br>P. N. Rao Manufacturing Technology Mc Graw Hill, 2001<br>P M Groover Fundamental of modern manufacturing: Materials, Processes, and System John Wiley and Sons, 2010 |
| **MOOC Courses** | https://www.mooc-list.com/tags/manufacturing |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | - | - | 3 | 3 | 3 |
| CO2 | 3 | - | 2 | 2 | - | 2 | 2 | - | 1 | 3 | - | - | 3 | 3 | 3 |
| CO3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 3 | 2 | 3 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO5 | 3 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Essentials of Information Technology |
| **Course Code** | CSL0201[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 2 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Basics of Computer system, Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the basics of Computer systems like types, I/O devices, storage of computer systems (Knowledge, Understand)**(BL1-Remember)**<br>**CO2-** Apply the various networking concepts, topologies and remove deadlocks. (Apply).**(BL2-Understand)**<br>**CO3-** Explain various memory management techniques and Analyze the concept of Sub-programs and blocks (Analysis)**(BL3-Apply)**<br>**CO4-** Design the concept of software, operating system for better utilization of external system (Design)**(BL4-Analyze)**<br>**CO5-** Evaluating the various algorithm, its solution and other communication techniques. (Investigation).**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Computer Basics: Basics of Computer Systems(T1,T2), Evolution of Computers, Computer Generations, Classification of Computers(T1,T3), Computer Applications, Interaction between User and Computer(T7). Hardware Components, Basic Computer Organization, Input and Output Devices(T1,T3), Central Processing Unit(T1), System Bus Architecture, Memory or Storage Unit | Lecture with White Board, PPT | 6 |
| 2 | Operating System: Introduction to Operating System, Function of Operating Systems(T1), Working Knowledge of GUI-Based Operating System (T3,T4), Working with latest version of Windows(T3,T4). Various Operating Systems, Evaluation of Operating System(T3,T4,T,7), Virtual Machine, Operating Systems for Mobile, Installation of Operating System(T1,T3,T4), Boot Process. | Lecture with White Board, PPT | 6 |
| 3 | Computer Networks and World Wide Web: Introduction to Computer Networks (LAN, MAN, WAN, PAN)(T3,T4), Network Topologies, Ethical Issues related to Network Security(T2,T3). Internet and World Wide Web(T7,T8), Internet Evolution(T1), FTP, Electronic Mail, Search Engines(T1), Introduction to HTML, Static and Dynamic Web Pages | Lecture with White Board, PPT | 6 |
| 4 | Computer Software: Introduction, System Software(T1,T3), Application Software, Firmware(T3), Software Installing and Uninstalling(T3,T4), Software Development Steps, Characteristics of good software(T1,T7), Usability of software, Introduction to Free and Open Source Software(T3,T4), Introduction to Database Management System | Lecture with White Board, PPT | 6 |
| 5 | Subprograms and Blocks: Problem Solving: Flow Charts(T3,T4), Tracing Flow Chart, Algorithms. Fundamentals of sub-programs(T1,T3,T4), Scope of life time of variables, static and dynamic scope(T7), design issues of subprograms and operations, parameter passing methods(T3,T4), overloaded sub-programs, generic sub-programs(T1,T3), design issues for functions user defined overloaded operators | Lecture with White Board, PPT | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Explain the Installation process of Operating system and its Memory Management. | Experiments | BL2-Understand | 10 |
| 2-3 | Design of a Web Page which describe your Biodata. | PBL | BL3-Apply | 10 |
| 4-5 | Describe Software development life cycle (SDLC) with all components. | PBL | BL5-Evaluate | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 18 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | P. K. Sinha, Priti Sinha; Computer Fundamentals; BPB Publication. V. Rajaraman; Fundamentals of Computers; Prentice Hall of India Publication. G. G. Wilkinson; Fundamentals of Information Technology; Wiley-Blackwell Publishing. Yashwant P. Kanetkar; Let Us C; BPB Publication. |
| **Articles** | |
| **References Books** | E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. Ron Mansfield; Working in MS-Office; Tata McGraw Hill Publishing. |
| **MOOC Courses** | https://www.my-mooc.com/en/categorie/information-technology |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO3 | - | - | 1 | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | - | - | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Object Oriented Programming Methodology (Python) |
| **Course Code** | CSP0401[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic programming concept **(BL1-Remember)**<br>**CO2-** Understand the basics of Python like python origin downloading and installing and basic concept of python**(BL2-Understand)**<br>**CO3-** Apply the various conditional and looping statement and functional programming.**(BL3-Apply)**<br>**CO4-** Explain various objects numbers and sequence in python Analyze the concept of regular expression.**(BL4-Analyze)**<br>**CO5-** Evaluate the concept of object-oriented programming for better utilization of language.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Introduction to Python programming Introduction, origin of Python, Downloading, Installing and Running Python, Python Basics: Comment, Identifier, Indentations, Basic data types, conversions, operators, Build in functions. I/O Statements, Condition Statements & Loops: If, else, elif), conditional expressions, while, for, break continue | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 8 |
| Unit 2 | Data Structures in Python Lists: Introduction, Accessing list, Operations, Working with lists, Tuple: Introduction, Accessing tuples, Operations, Working with list, Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Set: Introduction ,Accessing set, Operations, Working with sets | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 8 |
| Unit 3 | Functions, Modules, File Handling Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous function, Global and local variables, Recursion. Modules: Creating modules, Importing module, Packages, File Handling :Opening and closing files, Reading and writing files | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 8 |
| Unit 4 | Exceptional Handling, Regular Expressions Exception Handling: Exception, Exception Handling, Try and Except clause, User Defined Exceptions, Exception handling in files). Regular Expressions: Introduction/motivation, special symbols and characters for REs , Match function, Search function., Matching VS Searching., Modifiers, Patterns. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 9 |
| Unit -5 | Object Oriented Programming in Python Introduction, OOPS Basics: Class and object, Constructors, Need of Encapsulations, Attributes, default attributes, static attributes, static methods, initializing objects, Pass by reference , self. Relational-ships: Introduction, Aggregation, Dependency. Inheritance: Need of Inheritance, Overriding, Super, Types of Inheritance. Abstract Class, methods. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| unit 1-2 | Practical Assignment | Experiments | BL2-Understand | 7 |
| 1-5 | Activity Based Learning | Experiments | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 100 | 60 | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Programming logics |
| **Course Code** | CST0201[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Windows/Linux operating system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember: Recall the syntax and basic concepts of C programming.**(BL1-Remember)**<br>**CO2-** Understand: Explain the meaning of C programming constructs and how they work together**(BL2-Understand)**<br>**CO3-** Apply : Apply the various conditional and looping statement and functional programming.**(BL3-Apply)**<br>**CO4-** Analyzing: Analyze and evaluate C programming code to identify errors and optimize performance.**(BL4-Analyze)**<br>**CO5-** Evaluate : Evaluate the effectiveness of C programming solutions and propose improvements.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Character set, variables and identifiers, built-in data types, arithmetic operators and expressions, constants and literals, simple assignment statements, basic input/output statements, simple 'C' programs. | Demonstration throughPPT, Computer | 10 |
| 2 | Conditional Statements and Loops: Decision making within a program, conditions, relational operators, logical connectives, if statement, if-else statement; Loops: while loop, do-while loop, for loop; nested loops, infinite loops; switch statement, structured programming. Array: One Dimensional Arrays - array manipulation, searching, insertion and deletion in an array; Two Dimensional Arrays - addition/multiplication of two matrices, transpose of a square matrix; string | Demonstration throughPPT, Computer | 10 |
| 3 | Pointer: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays, dynamic memory allocation. Functions: Standard library functions, prototype of a function, return type, function calling, block structure, passing arguments to a function - call by reference and call by value; recursive functions, arrays as function arguments. | Demonstration throughPPT, Computer | 10 |
| 4 | Structure and Union: Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays - arrays of structure, structures containing arrays, unions. Dynamic Memory Management: Use of malloc, calloc, realloc and free keywords | Demonstration throughPPT, Computer | 10 |
| 5 | File Management: Introduction, defining and opening a file, closing a file, input/output operations on files, error handling during i/o operations, random access to files, programs using files. Command Line Arguments: argv and argc arguments, programs using command line arguments. Preprocessor: Introduction, macro substitution, file inclusion, compiler control directives. | Demonstration throughPPT, Computer | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Life Insurance Premium Calculator | Experiments | BL3-Apply | 10 |
| 2-3 | Program to compare best life insurance plan using an array. | PBL | BL4-Analyze | 10 |
| 4-5 | Write a C program to read name and marks of n number of students from user and store them in a file. If the file previously exits, add the information of n students. | PBL | BL5-Evaluate | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 40 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 0 |

Part E

| | |
|---|---|
| **Books** | B. W. Kernighan, Dennis M. Ritchi; The C Programming Language; Prentice Hall. |
| **Articles** | |
| **References Books** | Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill E. Balagurusamy; Programming in ANSI C; Tata McGraw-Hill Publishing. |
| **MOOC Courses** | https://www.my-mooc.com/ja/mooc/logic-and-computational-thinking/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | - | 3 |
| CO3 | 2 | - | 1 | - | - | 2 | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Basic Electronics |
| **Course Code** | ECL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of modern physics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To become familiar with various types of semiconductors and basic electronic devices.**(BL1-Remember)**<br>**CO2-** To understand the operation of various electronic devices.**(BL2-Understand)**<br>**CO3-** To implement the concepts of semiconductors to various semiconductor devices.**(BL3-Apply)**<br>**CO4-** To analyze the various electronic devices and their frequency response.**(BL4-Analyze)**<br>**CO5-** To evaluate the performance of electronic devices such as diodes, transistors, function generators, and cathode ray oscilloscopes.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Semiconductor Basics: Intrinsic and Extrinsic Semiconductors, Current Mechanisms in Semiconductors: Drift and Diffusion Current. PN Junction: Formation of PN Junction, Creation of Depletion Layer, Forward and Reverse Biasing, Diode Current Equation, Volt – Ampere characteristics of PN junction diode and effect of temperature on V-I characteristics, Diode resistances, Diode Capacitances, Diode Equivalent circuits: Piecewise Linear approximation Model, Simplified approximation Model, Ideal equivalent circuit. | Lecture Method/Video Clips | 12 |
| II | Diode Applications: Diode as Rectifier: Half Wave rectifier, Full Wave Rectifier, Calculation of Average, RMS loads voltages and currents, Rectification efficiency, PIV, Ripple factor. Break Down Diodes: Avalanche and Zener Breakdown. V-I characteristics of Zener Diode, Zener Diode Specifications, Zener Diode Equivalent Circuit. Zener Diode as Shunt Regulator: Analysis of Zener diode as shunt regulator under varying Load capacitance and Supply voltage. | Lecture Method/Video Clips/Simulation | 10 |
| III | Bipolar Junction Transistor: Formation of NPN and PNP Transistor, unbiased and biased transistor, Transistor currents, Symbol of NPN and PNP Transistors, Common Base, Common Emitter and Common Collector Configurations along with Input and Output Characteristics, Transistor Amplifying action. Transistor Biasing: Load Line, Operating Point, Need of Biasing, Different Biasing Techniques: Fixed Bias, Emitter Stabilized Bias, Voltage Divider Bias, DC Bias with Voltage Feedback | Lecture Method/Video Clips/Virtual Labs | 10 |
| IV | Field Effect Transistor: JFET: Construction of N channel and P channel JFET, Working of JFET along with Drain and Transfer Curves, JFET Parameters and symbol, JFET Biasing. MOSFET: Construction and working of N channel and P channel Depletion and Enhancement MOSFETs, Drain and Transfer curves, Symbols. Operational Amplifier: Basics of operation amplifier, op-amp parameters: Input offset voltage, Output offset voltage, Slew rate, CMRR etc. Open and closed loop gain, Virtual Ground, Characteristic of ideal operational amplifier. Operational Amplifier Applications: Use of Ideal Op-amp to construct: Inverting amplifier, Non-inverting amplifier, Differentiator, Integrator, Adder, Subtractor etc. | Lecture Method/Video Clips/Virtual Labs | 12 |
| V | Electronic Instruments: Digital Voltmeter, Digital Multimeter, Cathode Ray Oscilloscope, Applications of CRO: Measurement of Voltage, Current, Time Period, Frequency, Use of Lissajous Pattern to Measure unknown frequency and phase difference, Function Generator. | Lecture Method/Video Clips/Virtual Labs/Simulation | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Introduction to Laboratory Equipment's: Cathode Ray Oscilloscope (CRO), Function Generator, Digital Multimeter. | Experiments | BL2-Understand | 2 |
| 3 | To study Full Wave Centre Tap Rectifier and calculate various parameters. | Experiments | BL4-Analyze | 2 |
| 1 | To study and plot the V-I characteristics of PN Junction Diode. | Experiments | BL4-Analyze | 2 |
| 4 | To study Full Wave Bridge Rectifier and calculate various parameters | Experiments | BL4-Analyze | 2 |
| 3 | To study and plot Input & Output Characteristics of BJT in Common Base Configuration | Experiments | BL5-Evaluate | 2 |
| 4 | To study and plot Input & Output Characteristics of BJT in Common Emitter Configuration | Experiments | BL4-Analyze | 2 |
| 2 | To Design Half-Wave rectifier by using basic electronic components | PBL | BL6-Create | 10 |
| 4 | To Design subtractor using OPAM | PBL | BL6-Create | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Boylestad & Nashelsky Electronics Devices and Circuit Theory Pearson Education India, 2009.<br>Ramakant A. Gayakwad Op Amps and Linear Integrated Circuits Englewood Cliffs: Prentice-Hall, 2012. |
| **Articles** | Popović, Božidar, et al. "Remote control of laboratory equipment for basic electronics courses: A LabVIEW-based implementation." Computer Applications in Engineering Education 21.S1 (2013): E110-E120. |
| **References Books** | Malvino, L. Electronic principles The McGraw Hill Companies, 2016.<br>Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press 2017<br>Graham Bell Electronic Devices and Circuits Prentice-Hall 2009 |
| **MOOC Courses** | https://nptel.ac.in/courses/122106025 |
| **Videos** | https://nptel.ac.in/courses/122106025 |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | 2 | - | - | - | 3 | - | - | - | - | 1 |
| CO2 | 3 | 2 | 1 | - | - | 2 | - | - | - | 3 | - | - | 2 | 2 | 2 |
| CO3 | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO4 | 1 | 1 | 1 | 3 | 2 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO5 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Principles of Electrical Engineering |
| **Course Code** | EEL0201[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of physics and basic electronics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Predict the behavior of any electrical circuits, Formulate and solve complex DC circuits.**(BL1-Remember)**<br>**CO2-** Predict the behavior of any electrical circuits, Formulate and solve complex single phase AC circuits.**(BL2-Understand)**<br>**CO3-** Predict the behavior of any electrical circuits, Formulate and solve complex Three phase AC circuits.**(BL3-Apply)**<br>**CO4-** Identify the type of electrical machine used for that particular application. Realize the requirement of transformers in transmission and distribution of electric power and other applications.**(BL4-Analyze)**<br>**CO5-** Predict the behavior of various measuring instruments in electrical engineering**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | D.C. Circuit: - Combination of resistance in series & parallel, their solution ,Star –Delta combination, KCL and KVL. Voltage and current sources, dependent and independent sources, source conversion, DC circuit's analysis using mesh & nodal method, Superposition theorem. | Lecture with white board, ppt | 10 |
| 2 | Single Phase Circuit:- Generation of Alternating Voltage & Currents, Their Equation, Definition, R.M.S and Average values, Vector representation of alternating quantities, Phasor relations between voltage & current in each of resistance, inductance and capacitance, A.C series circuit power & power factor , Resonance in series circuit. | Lecture with white board, ppt | 12 |
| 3 | Electrical Measuring Instruments:-Introduction and classification of Electrical Instruments, Essentials of indicating instruments, Moving iron instruments, Types ofmoving iron instruments, Advantages and Disadvantages of moving iron instruments, Applications of moving iron equipment, Permanente Magnet type moving coil instruments, extension of range of ammeters and voltmeter, Dynamometer type instruments, Dynamometer type wattmeters | Lecture with white board, ppt | 7 |
| 4 | Poly-phase Circuits:-Generation of Poly-phase Voltages, 3phase system, Phase sequence, Inter connection of 3 phases, Voltage, Currents & Power relationships in balanced 3 phase circuits, Power Measurement in single phase & 3 phase circuits.. | Lecture with white board, ppt | 8 |
| 5 | Transformer:- Construction & working principle of transformer, Emf equation, No load & Full load phasor diagram , Equivalent circuit, Losses & Efficiency, Voltage Regulation, Open circuit & Short Circuit Test on the Transformer | Lecture with white board, ppt | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Vincent Del Toro, Electrical Engineering Fundamentals, PHI Learning, II Edition |
| **Articles** | |
| **References Books** | 1. Basic Electrical Engg, Sunil S Gaikwad, Dream Tech/ Willey Publication. |
| **MOOC Courses** | https://www.coursera.org/courses?query=electrical |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 1 | 2 | 1 | 1 | 3 | - | 1 | - | - | 1 | - | 2 | 3 | 1 |
| CO3 | 2 | 1 | 2 | 1 | 2 | - | 2 | - | 2 | 2 | - | - | 1 | 2 | 2 |
| CO4 | 1 | 3 | 1 | 2 | 3 | - | - | - | - | - | - | - | 3 | 1 | 3 |
| CO5 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO6 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | - | 3 | 1 | 3 | 2 |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Communication Skills & Colloquim |
| **Course Code** | HUL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Student must have knowledge about Language proficiency. | | | **Co-Requisite/s** | Developed Communication skill. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Determine interpersonal skills and be an effective goal-oriented team player.**(BL1-Remember)**<br>**CO2-** Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct.□**(BL2-Understand)**<br>**CO3-** Examine attitudes, emotional intelligence and understand its influence on behavior.**(BL3-Apply)**<br>**CO4-** Justify approaches to conflict resolution**(BL4-Analyze)**<br>**CO5-** Evaluate Formal Communication.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✓<br>Environment ✕ | | | **SDG (Goals)** | SDG4(Quality education) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Module 1 | Introduction to Communication Skills, Objectives, Significance of Communication, Flow of Communication, Principles Communication, Essential Features, Process of Communication, Verbal (Oral & Written) and Non-verbal Communication, Barriers to Effective Communication, Introduction to Technical Communication, Major Difference between Technical Communication and General Communication. | Classroom Lecture, PPts, | 6 |
| Module 2 | Introduction & Significance of Listening skills, Types of Listening, Barriers in Effective Listening, Basic Grammar - Parts of Speech, Active Passive and Articles. | Classroom Lecture, PPts, | 6 |
| Module 3 | Introduction to Formal Letter Writing, Elements of Letter Writing and Style of Writing, Layout & Structure of Formal Letter Writing, Introduction to the Types of Business Letters- Enquiry, Calling Quotations, Order,Complaint and Adiustment.Introduction to Employment Communication- Job Application, Writing Resume, Differences among Resume, Curriculum Vitae & Bio-data. | Classroom Lecture, PPts, Videoes | 6 |
| Module 4 | Introduction to Oral Presentations, Objectives, Significance and Approach, Preparation and Delivery of Oral Presentation (topics to be selected by the teachers). Introduction to Interview Skills. How to Develop Interview Skills. Dos and Don't of Interviews, Types of Interviews, Reviewing TV Program/Book/News Paper Articles etc | Classroom Lecture, PPts, Videos | 6 |
| Module 5 | Introduction to Report Writing, Major Objectives of Writing Reports, Significance of Business/Technical, Types and Forms of Reports, Styles of Writing Reports- Printed Format, Memo Format, Letter Format, Book/Letter Text Format. Layout and Structure of Reports, Components of Reports, Writing. | Classroom Lecture, PPts, Videos | 6 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | 30 |

Part E

| | |
|---|---|
| **Books** | Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi |
| **Articles** | https://www.jetir.org/papers/JETIR2108373.pdf https://open.lib.umn.edu/communication/chapter/1-2-the-communication-process/ https://www.iosrjournals.org/iosr-jbm/papers/Vol22-issue8/Series-2/E2208024254.pdf |
| **References Books** | Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S |
| **MOOC Courses** | https://nptel.ac.in/courses/109103020 |
| **Videos** | https://nptel.ac.in/courses/109103020 |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 2 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | 2 | - | - | 3 | 2 | 3 |
| CO4 | 3 | 2 | - | 2 | 1 | - | - | - | - | 2 | - | - | 2 | 3 | 3 |
| CO5 | 3 | 2 | - | 2 | 1 | - | - | - | - | 2 | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Training Report |
| **Course Code** | MEC0701[P} |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | subject knowledge of Mechanical Engineering | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility. **(BL2-Understand)**<br>**CO2-** Identify the needs and problem of the community and involve them in problem solving. **(BL2-Understand)**<br>**CO3-** Utilize their knowledge in finding practical solution to individual and community problem. **(BL3-Apply)**<br>**CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)**<br>**CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices. | Field work | BL4-Analyze | 40 hrs |
| Module-II | It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings. | Field work | BL5-Evaluate | 40 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 0 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Evaluation of Industrial Training-1 |
| **Course Code** | MED0301[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | subject knowledge of first and second semester . | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility. **(BL2-Understand)**<br>**CO2-** Identify the needs and problem of the community and involve them in problem solving. **(BL2-Understand)**<br>**CO3-** Utilize their knowledge in finding practical solution to individual and community problem. **(BL3-Apply)**<br>**CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)**<br>**CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices. | Field work | BL3-Apply | 40 hrs |
| Module-II | It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings. | Field work | BL4-Analyze | 40 hrs |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2- | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | - | 1 | - | 2 | - | - | - | - | 01 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 01 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Evaluation of Industrial Training-2 |
| **Course Code** | MED0502[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | subject knowledge of Mechanical Engineering | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand themselves in relation to their community and develop among themselves since of social and civic and responsibility. **(BL2-Understand)**<br>**CO2-** Identify the needs and problem of the community and involve them in problem solving. **(BL2-Understand)**<br>**CO3-** Utilize their knowledge in finding practical solution to individual and community problem. **(BL3-Apply)**<br>**CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)**<br>**CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Industrial training has its own importance in a career of a student who is pursuing a professional degree. It is considered as a part of college curriculum. The objective of an industrial training is to provide us an insight regarding internal working of companies. We understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place. Industrial trainings provide an opportunity to learn practically through interaction, working methods and employment practices. | Field work | BL4-Analyze | 40 hrs |
| Module-II | It gives students an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college. Industrial visits provide an excellent opportunity to interact with industries and know more about industrial environment. Industrial trainings are arranged by TAP cell with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits/trainings. | Field work | BL5-Evaluate | 40 hrs |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 01 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 01 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Minor Project |
| **Course Code** | MED0603[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Mechanical engineering and interdisciplinary subjects. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To enhance writing skills and knowledge.**(BL2-Understand)**<br>**CO2-** To increase their mental ability.**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)**<br>**CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Identification of a problem and formulation of a topic of project/thesis | PBL | BL3-Apply | 15 hrs |
| Module-III | Dissertation and Viva-voci | PBL | BL5-Evaluate | 20 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2- | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | - | 1 | - | 2 | - | - | - | - | 01 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 01 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Major Project |
| **Course Code** | MED0702[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Mechanical engineering and interdisciplinary subjects. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To enhance writing skills and knowledge.**(BL2-Understand)**<br>**CO2-** To increase their mental ability.**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thoughts.**(BL4-Analyze)**<br>**CO4-** To have Dissertation works as skills development in students. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| **Modules** | **Contents** | **Pedagogy** | **Hours** |
|---|---|---|---|
| Module-I | | | |

Part C

| **Modules** | **Title** | **Indicative-ABCA/PBL/ Experiments/Field work/ Internships** | **Bloom's Level** | **Hours** |
|---|---|---|---|---|
| Module-I | Identification of a problem and formulation of a topic of project/thesis | PBL | BL3-Apply | 48 hrs |
| Module-III | Dissertation and Viva-voci | PBL | BL5-Evaluate | |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 50 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Major Project |
| **Course Code** | MED0803[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 8 | 8 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Mechanical engineering and interdisciplinary subjects. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To enhance writing skills and knowledge.**(BL2-Understand)**<br>**CO2-** To increase their mental ability.**(BL3-Apply)**<br>**CO3-** To inculcate the ability to express innovative opinion and thoughts.**(BL4-Analyze)**<br>**CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Module-I | Identification of a problem and formulation of a topic of project/thesis | PBL | BL3-Apply | 15 hrs |
| Module-II | To have field work and data collection through a chosen methodology | PBL | BL4-Analyze | 15 hrs |
| Module-III | Dissertation and Viva-voci | PBL | BL5-Evaluate | 20 hrs |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 150 | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 300 | 0 | 120 | 60 | 180 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Robotic Process Automation |
| **Course Code** | MEE0621 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of mechanical systems and computer science engineering | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To understand basic concept of Robotic process Automation**(BL1-Remember)**<br>**CO2-** To introduce different platforms for RPA**(BL2-Understand)**<br>**CO3-** To identify and apply Image, Text and Data Tables Automation**(BL3-Apply)**<br>**CO4-** To analyze- how to handle the User Events and various types of Exceptions and strategies**(BL4-Analyze)**<br>**CO5-** To evaluate the deployment of the Robotic automation.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Introduction to Robotic Process Automation: Metal Cutting: Scope and techniques of automation, Benefits of RPA, Components of RPA, RPA platforms, The future of automation. RPA BASICS: History of Automation, RPA vs Automation, Processes& Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads, RPA Advanced Concepts, Standardization of processes, RPA Development methodologies, Robotic control flow, Risks & Challenges with RPA - RPA and emerging ecosystem. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-II | Overview of Robotic Process Automation Tools: Introduction to Robotic Process Automation Tools, Basic components in a RPA platform, Installation details of RPA tools, Types of Templates, User Interface, Domains in Activities, Workflow Files in the RPA platform | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Process Components and Activities: Process Components and Activities: User Interface Automation Activities, System Activities, Variables, Arguments, Imports Panel and User Events | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-IV | App Integration, Recording and Scraping: App Integration, Recording, Scraping, Selector, Workflow Activities. Example of Automate login to your (web)Email account, recording mouse and keyboard actions to perform an operation, scraping data from website and writing to CSV. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-V | Data Manipulation and PDF Automation: Data Manipulation, Automation of Virtual Machines, Introduction to Native Citrix Automation, Text and Image Automation, PDF Automation Workflow Management Automation: RPA Orchestrator Overview, Orchestrator activities | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | UiPath by Alok Mani Tripathi Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool Packt Publishing, Mumbai, 2018. |
| **Articles** | |
| **References Books** | Tom Taulli The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems Apress publications, 2020. |
| **MOOC Courses** | https://www.coursera.org/courses?query=robotic%20process%20automation |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 |
| CO2 | 1 | 1 | 1 | - | - | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 |
| CO3 | 1 | 2 | 2 | - | - | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO4 | 2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 3 |
| CO5 | 2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | 1 | 1 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Electric Vehicle Engineering |
| **Course Code** | MEE0622 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of electrical engineering and automobile engineering. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall fundamental concepts of electric and automobile engineering**(BL1-Remember)**<br>**CO2-** To understand fundamental concepts of electric vehicle propulsion systems**(BL2-Understand)**<br>**CO3-** To implement advanced control strategies for optimizing electric vehicle efficiency and performance.**(BL3-Apply)**<br>**CO4-** To analyze the performance characteristics of electric vehicle components**(BL4-Analyze)**<br>**CO5-** To evaluate the impact of electric vehicles on sustainability and the environment**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | ELECTRIC VEHICLES: Introduction, Components, vehicle mechanics – Roadway fundamentals, vehicle kinetics, Dynamics of vehicle motion - Propulsion System Design. | Lectures with whiteboard/PPT, Quiz, Group discussion | |
| Unit-II | BATTERY: Basics – Types, Parameters – Capacity, Discharge rate, State of charge, state of Discharge, Depth of Discharge, Technical characteristics, Battery pack Design, Properties of batteries | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Vehicle Mechanics: History of Vehicle Development, General Configuration of Automobile, Body and Chassis Fundamentals: General Packaging, Types of Structural System, Backbone Construction; Body and Chassis Materials. Automotive Powertrain Mechanical, Suspensions system, Steering System, NVH, Control System Integration and Implementation. Front-Wheel Drive (FWD) Powertrains, Rear-Wheel Drive Powertrains (RWD), Multi-Wheel Drive Powertrains (AWD and 4WD). | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-IV | Conversions and motors: Introduction of DC-DC, AC-AC, AC-DC, DC-AC, four-quadrant operation, Driver circuits. Principle and working of DC motor, Characteristics and Types of DC Motors- Overview (Speed torque characteristics) of Permanent Magnet motor, BLDC Motor, Induction motor. Comparison of all motors. | Lectures with white board and PPT, Quiz, seminar, Poster and PPT | 8 |
| Unit-V | Hybrid Powertrain: Series HEVs, Parallel HEVs, Series–Parallel HEVs, Complex HEVs, Operating Modes, Degree of Hybridization, Comparison of HEVs, Plug-in Hybrid Electric Vehicles (PHEVs) Real Life examples of HEVs, compare and contrast the performance of ICE vehicles, HEVs and EVs. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Iqbal Hussain, Electric & Hybrid Vehicles Design Fundamentals Second Edition, CRC Press, 2011. James Larminie Electric Vehicle Technology Explained John Wiley & Sons, 2003. |
| **Articles** | |
| **References Books** | Mehrdad Ehsani, Yimin Gao, Ali Emadi Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals CRC Press, 2010. Sandeep Dhameja Electric Vehicle Battery Systems Newnes, 2000 |
| **MOOC Courses** | https://www.mooc-list.com/tags/electric-vehicles |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 1 | - | - | - | - | - | - | 1 | 1 | 1 |
| CO2 | 1 | - | - | - | - | 1 | - | - | - | - | - | - | 1 | 1 | 2 |
| CO3 | 1 | 1 | 1 | 2 | 1 | 1 | 3 | - | - | - | 1 | - | 2 | 2 | 2 |
| CO4 | 1 | 2 | 2 | 2 | 2 | 1 | 3 | 1 | - | - | 2 | 1 | 3 | 3 | 3 |
| CO5 | 1 | 2 | 3 | 3 | 3 | 1 | 3 | 1 | - | - | 3 | 1 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Tribology Engineering |
| **Course Code** | MEE0623 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences, material science and machine design | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of Engineering Mechanics and machine design**(BL1-Remember)**<br>**CO2-** To understat the concept of tribology engineering**(BL2-Understand)**<br>**CO3-** To apply the tribo design in various machine elements**(BL3-Apply)**<br>**CO4-** To design the components through tribology in lubrication and wear mechanism**(BL4-Analyze)**<br>**CO5-** To evaluate the results of designing which leads to reduction of power consumption in gears, bearings and other contacting parts of machinery**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Introduction Introduction to tribology, History of tribology, Interdisciplinary Approach, Principles of tribo design, Tribological problems in machine design, Economic Benefits. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Wear Wear Mechanisms, Adhesive Wear, Abrasive Wear, Corrosive Wear, Fretting Wear, Wear Analysis | Lectures with whiteboard and PPT,Quiz, Report writing | 8 |
| Unit-IV | Lubrication and Lubricants Importance of Lubrication, Boundary Lubrication, Mixed Lubrication, Full Fluid Film Lubrication ; Hydrodynamic, Elastohydrodynamic lubrication, Types & Properties of Lubricants, Lubricants Additives | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-V | Fluid film lubrication Fuid mechanics concepts, Equation of Continuity & Motion, Generalized Reynolds Equation with Compressible & Incompressible Lubricants. Application of Tribology- Introduction, Rolling Contact Bearings, Gears, Journal Bearings, Finite Bearings | Lectures with whiteboard/PPT, Quiz, Group discussion | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | T.A. Stolarski Tribology in Machine Design Butterworth- Heinemann |
| **Articles** | |
| **References Books** | Dudley D.Fulier Theory and practice of Lubrication for Engineers New York Company, 1998 Moore, Desmond F. Principles and applications of Tribology Pergamon press, 1975 G W Stachowiak, A W Batchelor Engineering Tribology Elsevier publication 1993 |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc20_mm12/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | - | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 |
| CO2 | 1 | 1 | 1 | - | - | 1 | - | - | - | - | - | 1 | 1 | 1 | 1 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | 2 | 1 | - | - | - | 1 | 1 | 3 | 3 | 3 |
| CO5 | 1 | 3 | 3 | 3 | 3 | 2 | 1 | - | - | - | 2 | 1 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Product Design and Development |
| **Course Code** | MEE0703 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of CAD/ CAM | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the concepts of product development process. **(BL1-Remember)**<br>**CO2-** Apply the concepts of design principles. **(BL3-Apply)**<br>**CO3-** Describe the methods of conducting market research and analysis.**(BL2-Understand)**<br>**CO4-** Analyze methods of Prototyping and testing. **(BL4-Analyze)**<br>**CO5-** Evaluate product development methods**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction to product design, product definition, design definition, the role and nature of design, old and new design methods with suitable examples and illustrations, the challenges of product development. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-2 | Product Planning and Marketing The product planning process, opportunity identification, project evaluation and prioritization, resource allocation and timing, pre-project planning, reflect on results and the process, marketing strategies. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-3 | Product Design Process Customer needs identification, product specifications, | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-4 | An approach to industrial design, general approach to man-machine relationship-workstation design –working positions. Design of controls, displays and its compatibility, ergonomic aspects-anthropometric data and its importance in design. Role of CAD/CAM/CAE software's in product design. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Quality and Reliability aspects in PDD and Product Appraisal Definition of quality and Reliability, parameters and characteristics, difference between quality and reliability, Quantifying reliability, bathtub curve MTTF and MTBF, system reliability, requisiteness for reliability of product. Existing techniques such as W | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Karl.T.Ulrich, Steven D Eppinger-Irwin Product Design and Development McGrawhill-2000 |
| **Articles** | |
| **References Books** | Srinath LS Concepts in Reliability Engineering- East -West Press, NewDelhi |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc21_me83/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | 2 | - | - | - | 2 | 1 | - | 2 | 2 | - | 3 | - | 3 |
| CO2 | 1 | 2 | 2 | - | - | 2 | 3 | 1 | 3 | 3 | 3 | - | 3 | 3 | 3 |
| CO3 | 2 | 2 | 2 | - | - | 2 | 3 | 1 | 3 | 3 | 3 | - | 3 | 3 | 3 |
| CO4 | 1 | 3 | 2 | - | 2 | 2 | 3 | 1 | 3 | 3 | 3 | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | 2 | - | 2 | 2 | 3 | 1 | 3 | 3 | 3 | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Non-Conventional Energy resources |
| **Course Code** | MEE0705 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of energy and souses of energy. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the energy conversion systems.**(BL1-Remember)**<br>**CO2-** To understanding the solar thermal plate.**(BL2-Understand)**<br>**CO3-** To apply the concept related to non conventional energy.**(BL3-Apply)**<br>**CO4-** To analyze the energy conversion in non-conventional energy conversion in various fields.**(BL4-Analyze)**<br>**CO5-** To evaluate the performance and efficiency of energy aspects on the basis of different parameters.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | General Introduction Various non-conventional energy resources–Introduction availability classification relative merits and demerits. Solar Cells Theory of solar cells. Solar cell materials. Solar cell array. Solar cell power plant imitation. | Lectures with white board and PPT, Quiz,Reportwriting,Case Based Assignments | 8 |
| Unit-2 | Solar Thermal Energy Solar radiation flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, application and performance. Solar thermal power plants. Thermal energy storage for solar heating and cooling limitations | Lectures with white board and PPT, Quiz,Reportwriting,Case Based Assignments | 8 |
| Unit-3 | Geothermal Energy Resources of geothermal energy thermodynamics of geo-thermal energy conversion- electrical conversion non- electrical conversion environmental Magneto hydrodynamics (MHD) Principle of working of MHD power plant, Performance and limitations. Fuel Cells Principle of working of various types of fuel cells and their working, Performance and limitations. | Lectures with white board and PPT, Quiz,Reportwriting,Case Based Assignments | 8 |
| Unit-4 | Thermo-electrical and thermionic conversions Principle of working, performance and limitations. Wind Energy; Wind power and its source, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitations of energy conversion systems. | Lectures with white board and PPT, Quiz,Reportwriting,Case Based Assignments | 8 |
| Unit-5 | Bio mass Ocean thermal energy conversion (OTEC) Availability, theory and working principle performance and limitations Wave and Tidal wave principle of working, performance and limitations. Water recycling plant. | Lectures with white board and PPT, Quiz,Reportwriting,Case Based Assignments | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Raja etal, Introduction Non-Conventional energy resources" SciTech Publications. 2. Johan Twiden and Tony weir "Renewal energy resources "BSP Publications 2006. 3. D.S Chauhan " Non-Conventional energy resources" New Age International. 4. C.S Solanki" Renewal Energy Technology" A Practical Guide for Beginners" PHI. |
| **Articles** | |
| **References Books** | 1. Ghosh and Mallick "Manufacturing Science" East West Press, 2010. 2. Jain R. K. "Production Technology" Khanna Publishers, 2001. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_ge14/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | - | 3 | 3 | - | 1 | 3 | - | 3 |
| CO2 | 3 | - | 2 | 2 | 1 | 2 | 2 | - | 3 | 3 | 2 | - | 3 | 3 | 3 |
| CO3 | 2 | - | 2 | 1 | 3 | - | 3 | 1 | 2 | 1 | - | 2 | 3 | 3 | 3 |
| CO4 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 | 2 | 3 | - | 3 |
| CO5 | 1 | 2 | 1 | 3 | 2 | - | 2 | - | - | - | - | 1 | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Optimization Methods |
| **Course Code** | MEE0706 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Prerequisite requirements for this course include a strong foundation in calculus, linear algebra, and numerical methods. Proficiency in mathematical modeling and problem-solving is essential. Prior knowledge of optimization concepts, algorithms, and their applications would be beneficial. Basic programming skills may also be advantageous for implementing numerical methods and algorithms. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Recall the fundamental concepts and principles of optimization.**(BL1-Remember)**<br>**CO2-** Understand the principles behind optimization techniques such as direct search methods, Lagrange multipliers, and Kuhn-Tucker conditions.**(BL2-Understand)**<br>**CO3-** Apply optimization techniques to single-variable and multi-variable functions, considering both unconstrained and constrained scenarios.**(BL3-Apply)**<br>**CO4-** Evaluate the effectiveness of different optimization techniques in various scenarios.**(BL3-Apply)**<br>**CO5-** Critically evaluate the performance of optimization algorithms in solving real-world problems.**(BL5-Evaluate)**<br>**CO6-** Design novel optimization algorithms or modify existing ones to address specific optimization challenges**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit -1 | Unconstrained Optimization: Optimizing Single-Variable Functions, conditions for Local Minimum and Maximum, Optimizing Multi-Variable Functions. | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |
| Unit -2 | Constrained Optimization: Optimizing Multivariable Functions with Equality Constraint: Direct Search Method, Lagrange Multipliers Method, Constrained Multivariable Optimization with inequality constrained: Kuhn-Tucker Necessary conditions, Kuhn – Tucker Sufficient Conditions. | Audio/Video clips, group discussion, lecture with PPT, Review Analysis | 8 |
| Unit -3 | Optimization: Quasi-Newton Methods and line search, least squares optimization, Gauss-Newton, Levenberg- Marquartd, Extensions of LP to Mixed Integer Linear Programming (MILP), Non-Liner Programming, The Newton Algorithm, Non-Linear Least Squares, Sequential Quadratics Programming (SQP), Constrained Optimization, SQP Implementation, Multi-Objective Optimization, Branch and Bound Approaches, Genetic Algorithms and Genetic Programming, Singular Based Optimization, On-Line Real-Time Optimization, Optimization in Econometrics Approaches – Blue. | Audio/Video clips, group discussion, lecture with PPT, Review Analysis | 8 |
| Unit -4 | Optimization and Functions of a Complex Variable and Numerical Analysis: The Finite Difference Method for Poisson's Equation in two Dimensions and for the Transient Heat Equation, Eulers Method, The Modified Euler Method and the Runga-Kutta Method for Ordinary Differential Equations, Gaussian Quardative Tranzoidal Rule and Simpson's 1/3 and 3/8 Rules, the Newton Raphson in one and two Dimensions, Jacobi's Iteration Method. | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |
| Unit -5 | Optimization in Operation Research: Dynamic Programming, Transportation – Linear Optimization Simplex and Hitchcock Algorithms, Algorithms, Minimax and Maximum Algorithm, Discrete Simulation, Integer Programming – Cutting Plane Methods, Separable Programming, Stochastic Programming, Goal Programming, Integer Linear Programming, Pure and Mixed Strategy in theory of Games, Transshipment Problems, Heuristic Methods. | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Rao, S. S. (2009). Optimization: Theory and applications. John Wiley & Sons.<br>Boyd, S., & Vandenberghe, L. (2004). Convex optimization. Cambridge University Press. |
| **Articles** | |
| **References Books** | Bazaraa, M. S., Sherali, H. D., & Shetty, C. M. (2006). Nonlinear programming: Theory and algorithms. John Wiley & Sons.<br>Nocedal, J., & Wright, S. J. (2006). Numerical optimization. Springer Science & Business Media.<br>Bertsekas, D. P., & Tsitsiklis, J. N. (1996). Linear and nonlinear programming (2nd ed.). Athena Scientific. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc21_me10/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 3 | - | 2 | 1 | 1 | 3 | - | - | 3 | 3 | - | - | 2 | 2 | 2 |
| CO3 | 2 | -2 | 2 | - | 2 | 2 | 2 | - | 2 | 1 | 1 | 2 | 2 | 2 | 1 |
| CO4 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | 1 | 2 | 3 | - | 2 | 2 |
| CO5 | 1 | 2 | 1 | 1 | 1 | 2 | - | - | 1 | - | 2 | 1 | 2 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Introduction to Computational Fluid Dynamics |
| **Course Code** | MEE0707 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Prerequisite requirements for this course include a solid understanding of calculus, differential equations, and basic programming skills. Additionally, familiarity with numerical methods and computational techniques would be beneficial. A background in physics or engineering, particularly in fluid mechanics and heat transfer, is also recommended. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Recall the classifications of partial differential equations (PDEs) including elliptic, parabolic, and hyperbolic equations. Memorize the fundamental conservation laws governing fluid motion.**(BL1-Remember)**<br>**CO2-** Understand the difference between initial value and boundary value problems.**(BL2-Understand)**<br>**CO3-** Apply solution algorithms like Jacobi iterative and Gauss-Seidel methods to solve elliptic equations.**(BL3-Apply)**<br>**CO4-** Analyze the computational challenges associated with solving Navier-Stokes equations for incompressible fluid flow**(BL4-Analyze)**<br>**CO5-** Synthesize theoretical concepts with computational methods to devise strategies for enhancing stability and accuracy in numerical simulations.**(BL5-Evaluate)**<br>**CO6-** Evaluate the practical applicability and effectiveness of computational simulations in addressing engineering challenges related to fluid mechanics and heat transfer accurately.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit -1 | Evaluate the practical applicability and effectiveness of computational simulations in addressing engineering challenges related to fluid mechanics and heat transfer accurately. | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |
| Unit -2 | Parabolic PDE`s and Stability Analysis Parabolic PDE, Explicit and Implicit Methods, Consistency, Stability Analysis, Error Analysis, Modified Equation, Artificial Viscosity | Audio/Video clips, group discussion, lecture with PPT, Review Analysis | 8 |
| Unit -3 | Elliptic and Hyperbolic Equation Elliptic Equation, Solution algorithms, Jacobi Iterative, Point Gauss-Seidel and Line Gauss-Seidel Methods, Hyperbolic equations, FTFS, FTCS and BTCS methods | Audio/Video clips, group discussion, lecture with PPT, Review Analysis | 8 |
| Unit -4 | Numerical Methods for Conduction Heat Transfer Steady and Unsteady Heat Conduction equation, One-dimensional and Two-dimensional Steady State Problems, Three-Dimensional Problem, Transient One-dimensional Problem, False Transient Approach | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |
| Unit -5 | Numerical Methods for Incompressible Fluid Flow Governing Equation of Incompressible Fluid Flow, Difficulties in Solving Navier-Stokes equations, Stream-Vorticity Formulation, Primitive Variable Approach, Poisson Equation | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Smith, J. D., & Johnson, A. B. (2020). Numerical Methods for Partial Differential Equations: Theory and Applications. Publisher<br>Anderson, Jr, J. D. (1995). Computational Fluid Dynamics. McGraw Hill Education.<br>Pletcher, R. H., Tannehill, J. C., & Anderson, D. (2012). Computational Fluid Mechanics and Heat Transfer. CRC Press. |
| **Articles** | |
| **References Books** | Ferziger, J. H., & Peric, M. (2002). Computational Methods for Fluid Dynamics. Springer.<br>LeVeque, R. J. (2007). Finite Difference Methods for Ordinary and Partial Differential Equations: Steady-State and Time-Dependent Problems. Society for Industrial and Applied Mathematics.<br>Ferziger, J. H., & Peric, M. (2002). Computational Methods for Fluid Dynamics. Springer. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc21_me126/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 2 | 1 | - | 2 | 2 |
| CO3 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | - | 2 | 2 | 2 | 2 |
| CO4 | 1 | 2 | 2 | 2 | - | 2 | 2 | - | - | 2 | 2 | 2 | 2 | 2 | 2 |
| CO5 | - | 1 | 1 | 2 | 2 | 2 | 2 | - | - | - | - | 2 | 1 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Industrial Robotics |
| **Course Code** | MEE0709 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Engineering mechanics, Machine design | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** 1. Comprehend, classify and analyze the fundamentals of robotics.**(BL1-Remember)**<br>**CO2-** 2. Analyze the inverse manipulator kinematics and dynamics.**(BL2-Understand)**<br>**CO3-** 3. Gain the knowledge about the manipulator design and mechanism.**(BL3-Apply)**<br>**CO4-** 4. Elucidate the role of actuators, drive systems and sensors in robotics.**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit:1 | Introduction: Fundamentals and robot - components, joints, degrees of freedom, coordinates. The mechanics & control of mechanical manipulators. Spatial Descriptions and Transformations: Descriptions – Positions, Orientations, and Frames, Mappings, Operators – Translations, Rotations, and Transformations, Transformation arithmetic and transform equations, transformation of free vectors, Representation & Orientation. | | |
| Unit:2 | Manipulator Kinematics: Links & Connections. Actuator Space, Joint Space and Cartesian Space. Tools & Computational considerations. | | |
| Unit:3 | Solvability, Algebraic and Geometric. Standard Frames, Repeatability and Accuracy. Jacobians: Velocities and Static Forces: Time varying position and orientation. | | |
| Unit:4 | Linear and rotational velocity of rigid bodies. Jacobians & Singularities. Cartesian transformation of velocities and static forces. Kinematic Configuration. Workspace measures and attributes. Redundant and closed chain structures. Actuation Schemes, Stiffness & Deflections. Position Sensing & Force Sensing. | | |
| Unit:5 | Mass Distribution. Newton's and Euler's Equations. Iterative and Closed Form. Lagrangian formulation of manipulator dynamics. Manipulator Dynamics in Cartesian Space. Non-rigid body effects. Basic components & terminology. System Dynamics. Laplace transform and inverse Laplace transform. First and second order transfer functions. Proportional and proportional plus controllers. State space control methodology. Digital control and non-linear control systems. | | |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | John J. Craig, "Introduction to Robotics Mechanics and Control", Pearson Education Limited 2022<br>Saeed B. Niku, "Introduction to Robotics Analysis, Control, Applications", John Wiley & Sons Ltd 2020. |
| **Articles** | |
| **References Books** | Nicholas Odrey, Mitchell Weiss, Mikell Groover, Roger Nagel and Ashish Dutta. "Industrial Robotics-Technology, Programming and Applications", McGraw Hill Education; 2nd edition, 2017. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | - | 2 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | 2 | 1 | - | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 2 | 2 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Alternative fuels and emission control |
| **Course Code** | MEE0710 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of applied chemistry, thermodynamics and IC engines | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** recall the basics of chemistry and thermodynamics**(BL1-Remember)**<br>**CO2-** Describe the significance of alternative fuels over conventional fuels**(BL2-Understand)**<br>**CO3-** Test the fuels in various engines**(BL3-Apply)**<br>**CO4-** Analyze the performance of an engine under standard conditions with a specific alternative fuel**(BL4-Analyze)**<br>**CO5-** Evaluate the various alternative fuels and their suitability with a specific engine and environment**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Introduction Alternate fuels and renewable sources of energy in automobile field - availabilities, Storage, Handling and Safety aspects- Costs and other factors. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Renewable sources of energies Introduction about the solar energy collectors- Concentrating, Flat plate collectors- application wind energy-Bio energy, Geo thermal energy- Chemical energy: Fuel cells, Batteries; Hydrogen energies- Energy conservations in sterling and heat pumps. | Lectures with whiteboard/PPT, Quiz, Group discussion | |
| Unit-IV | Pollutants: Sources from SI and CI Engines, Two Stroke (SI and CI) engine pollution formation; Indian Emission Standards for SI and CI engines; European Emission Standards Comparison with alternate fuel emissions. | Lectures with whiteboard/PPT, Quiz, Group discussion | |
| Unit-V | Pollution control Techniques and Test procedures: Optimization of operating factor- EGR Fumigation- Air injection-PCV system (opens Closed) Catalytic Converters-Catalyst use of unleaded petrol. Gas Analyzers-Different Smoke meters-Different test methods; Electric Vehicles-Simple layout-Traction batteries-Re charging methods-rating pollution factors, Fuel Cells. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Ganesan V., Internal Combustion Engines. 2. Held P.M., High speed Combustion Engines 3. Rai,GD Non Conventional sources of Energy |
| **Articles** | |
| **References Books** | 1. Obert E.F., Internal Combustion Engines. 2. SAE Transaction-Vehicle emission. 3. John. H. Jhonson, Diesel Particulate Emissions Landmark Research |
| **MOOC Courses** | https://www.mooc-list.com/tags/renewable-energy |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | 3 | 1 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 3 | 2 | 2 |
| CO2 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 1 | 2 | 3 | 2 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Sensors, Actuators and Signal Conditioning |
| **Course Code** | MEE0711 |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of measurement and metrology and basic electrical/ electronics engineering. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the measurement and metrology**(BL1-Remember)**<br>**CO2-** To comprehend and classify the behavior of different types of sensors**(BL2-Understand)**<br>**CO3-** To implement the data acquisition systems with different sensors for real-time applications.**(BL3-Apply)**<br>**CO4-** To conduct experiments and measurements in laboratory and realize hands-on experience on real components, sensors and actuators.**(BL4-Analyze)**<br>**CO5-** To evaluate and realize the trends in sensor technology, industrial network and automation.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Basics of Energy Transformation -Introduction to sensors and transducers, Principle of sensing and transduction, Classification of sensors. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-II | Performance Characteristics of Sensors -Static characteristics: accuracy, precision, resolution, sensitivity, linearity, span and range - Dynamic characteristics, Mathematical model of transducer: zero, first and second, Response to impulse, step, ramp and sinusoidal inputs, Selection criteria of sensor. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Actuator Performance and Selection- Sensor Technology -Electrical actuating systems: solid-state switches, solenoids and electric motors: DC motor, stepper motor, and Inertial measurement unit, Mechanical actuating systems: types of motion, kinematic chains, cams and gears, Pneumatic and hydraulic actuating systems: diaphragms, bellows and control valves. Process of developing sensors, Trends in sensor technology and IC sensors, Sensor array's and multi-sensor systems, Smart sensors, Industrial network and automation. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-IV | Measurement of Industrial Parameters -Measurement of temperature: thermistor and LM35, Measurement of pressure: strain gauge and piezoelectric type, Measurement of distance: ultrasonic, linear variable differential transformer and capacitance type, proximity sensor, Infrared sensor, Pulse oximeter and Tachometer. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-V | Data Acquisition System andSignal Conditioning -Data Acquisition: single channel and multi-channel data acquisition, Data logging, Interfacing of sensors using DAQ cards, Applications: automobile and biological systems.Amplification, Filtering, Multiplexing, Conversion techniques, Sensor interface design: Wheatstone bridge and operational amplifier circuits for various applications. | Lectures with whiteboard/PPT, Quiz, Group discussion | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | D. Patranabis, "Sensors and Actuators", 2nd Edition, PHI Learning, New Delhi, India, 2013. Ramon Pallas-Areny, John G. Webster, "Sensors and Signal Conditioning", 2nd Edition, Wiley India Pvt. Ltd., India, 2012. |
| **Articles** | |
| **References Books** | D. Patranabis, "Sensors and Transducers", 2nd Edition, PHI Learning Pvt. Ltd., New Delhi, India, 2011. Jon S. Wilson, "Sensor Technology Hand Book", Newnes Publishing Company, Boston, USA, 2005. A.K. Sawhney, Puneet Sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai and Co. Pvt. Ltd., New Delhi, India, 2014. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc19_ee41/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | - | 1 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 3 | 2 | 2 |
| CO5 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 2 | 3 | 1 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Theory of Production process |
| **Course Code** | MEE0717 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of materials science, manufacturing and industrial engineering | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various production processes.**(BL1-Remember)**<br>**CO2-** To understand the mechanism of production processes.**(BL2-Understand)**<br>**CO3-** To implement the different metal forming operations to deform the parts.**(BL3-Apply)**<br>**CO4-** To analyze the different parameters used in production processes.**(BL4-Analyze)**<br>**CO5-** To evaluate different forces which act during the operations.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Theory of Casting: Casting process and solidification, types of patterns and allowances, types and properties of molding sand, elements of mould and design consideration, cores, core print, chills, gates, riser, sand casting. | Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz | |
| Unit-II | Gating System: Gating system design, riser design, methods of calculating riser volume, feeding distance calculations, die casting, centrifugal casting, investment casting. Theory of Melting and production of ferrous and non-ferrous materials, cupola furnace, defects, remedies and inspection of casting. | Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz | 8 |
| Unit-III | Mechanical Fundamentals of metal working: Elastic and plastic deformation, yield criteria for ductile materials, plastic stress strain relationship, hot working and cold working, classification of metal working, forging process and its operations, forgeability, analysis and classification of forging process. | Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz | 8 |
| Unit-IV | Metal forming: Mechanism of rolling process, Analysis and classification of rolling, rolling mill arrangement, rolling pass, force calculation in rolling process, rolling defects. Classification of extrusion process, analysis and calculation of Extrusion, analysis of wire drawing, rod and tube drawing process, forming defects. | Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz | 8 |
| Unit-V | Welding – Classification of welding process, thermal effect in welding, heat affected zone in welding, Principal of welding processes: gas welding, shielded metal arc welding, GTAW, GMAW, SAW, Resistance welding, soldering, brazing and braze welding and their application, residual stress in welding, welding distortion and its types, weldability. | Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | Ghosh and Mallick Manufacturing Science East West Press, 2010 Jain R. K. Production Technology Khanna Publishers, 2001 |
| **Articles** | |
| **References Books** | Pandey P. C. Production Engineering Science Standard Publishers, 2010 Rao P. N. Manufacturing Technology Mc Graw Hill, 2001 Groover P M Fundamental of modern manufacturing: Materials, Processes, and System John Wiley and Sons, 2010 |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc20_me73/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | - | - | 3 | 3 | 3 |
| CO2 | 3 | - | 2 | 2 | - | 2 | 2 | - | 1 | 3 | - | - | 3 | 3 | - |
| CO3 | 3 | 2 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 3 | 2 | 3 | 2 | 1 | - | 1 | - | - | - | - | - | 2 | - | 3 |
| CO5 | 3 | 1 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | 2 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Vibration and Noise- Measurement and Control |
| **Course Code** | MEE0809 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Prerequisites for the course "Mechanical Vibration and Noise" include a solid understanding of dynamics, mechanics of materials, and mathematics, particularly differential equations and linear algebra. Familiarity with mechanical systems and their behavior under varying loads is also essential. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic of mechanical vibration and noise.**(BL1-Remember)**<br>**CO2-** To Understand the mathematical model and determine the natural and forced frequency of mechanical system**(BL2-Understand)**<br>**CO3-** To implement measurement of the free, Noise and forced vibration with damping**(BL3-Apply)**<br>**CO4-** To analyze the theoretical concept of vibration in shock absorber**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of mechanical vibration and noise in various fields such as research, structure health monitoring and industries**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit -1 | Fundamental Aspects of Vibrations: Vibration, main causes, advantages and disadvantages; engineering applications of vibration and noise; vector method of representing harmonic motion; characteristics of vibration, harmonic analysis and beats phenomenon, work done by harmonic forces on harmonic motion; periodic, non-harmonic functions- Fourier series analysis; evaluation of coefficients of Fourier series; elements of vibratory system; lumped and distributed parameter systems. Undamped Free Vibrations: Undamped free vibration: Single degree of freedom Systems, introduction, undamped free vibration – Natural frequency' of free vibration, Rayleigh's method, stiffness of spring elements, effects of spring mass, Energy method, Newton's method and D' Alembert' s principle- problems | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |
| Unit -2 | Damped Free Vibrations: Viscous damping: coefficient of damping; damping ratio; under damped, over damped and critically damped systems; logarithmic decrement; frequency of damped free vibration; Coulomb or dry friction damping; frequency, decay rate and comparison of viscous and Coulomb damping; solid and structural damping; slip or interfacial damping. | Audio/Video clips, group discussion, lecture with PPT, Review Analysis | 8 |
| Unit -3 | Forced Vibration: Forced vibration: Single degree of freedom systems, steady state solution with viscous damping due to harmonic force solution by complex algebra, concept of response, reciprocating and rotating unbalance, vibration isolation Transmissibility ratio, energy dissipated by damping equivalent, Viscous damping, Structural damping, sharpness or resonance, base excitation. Whirling Motion and Critical Speed: Whirling motion and Critical speed: Definitions and significance .Critical – speed of a vertical , light –flexible shaft with single rotor : with and without damping .Critical speed of a shaft carrying multiple discs (without damping ), Secondary critical speed. | Audio/Video clips, group discussion, lecture with PPT, Review Analysis | 8 |
| Unit -4 | Systems With Two Degrees of Freedom : Un-damped free vibration of Two-D.O.F and Principal modes of vibration; torsion vibrations; Forced, Un-damped vibrations with harmonic excitation; Coordinate coupling; Dynamic vibration absorber; torsion Vibration Absorber; Pendulum type of dynamic vibration. | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |
| Unit -5 | Noise Engineering – Subjective response of sound: Frequency and sound dependent human response; the decibel scale; relationship between, sound pressure level (SPL), sound power level and sound intensity scale; relationship between addition, subtraction and averaging, sound spectra and Octave band analysis; loudness; weighting networks; equivalent sound level, auditory effects of noise; hazardous noise, exposure due to machines and equipment's; hearing conservation and damage risk criteria, daily noise doze. Noise: Sources, Isolation and Control: Major sources of noise on road and in industries, noise due to construction equipments and domestic appliances, industrial noise control, strategies- noise control at source (with or without sound enclosures), noise control along the path (with or without partitions and acoustic barriers); noise control at the receiver, ear defenders, earplugs, semi-insert protectors. | Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Fabrication of Model of Spring Mass System | PBL | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Grover, G. K. (2009). Mechanical Vibrations. Nem Chand & Bros.<br>Rao, S. S. (2011). Mechanical Vibrations. Pearson Education. |
| **Articles** | |
| **References Books** | Thomson, W. T. (2010). Theory of Vibration with Applications. Cengage Learning.<br>Den Hartog, J. P. (1985). Mechanical Vibrations. Dover Publications. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/107/112107212/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 3 | - | 2 | 1 | 1 | 3 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | 2 | -2 | 2 | - | 2 | 2 | 2 | - | 2 | 1 | 1 | 2 | 3 | 2 | 2 |
| CO4 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | 1 | 3 | 3 | - | 2 | 2 |
| CO5 | 1 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | 2 | 1 | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Computer Integrated Manufacturing |
| **Course Code** | MEE0813 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of properties of Materials types of manufacturing process, Computer application, Production, planning and control. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the production and industrial engineering**(BL1-Remember)**<br>**CO2-** To describe the significance of group technology and cellular manufacturing. **(BL2-Understand)**<br>**CO3-** To apply the basics of CAD and CAM in the methodology of CAPP and FMS.**(BL3-Apply)**<br>**CO4-** To analyze the PPC and Production scheduling. **(BL4-Analyze)**<br>**CO5-** To evaluate the master production scheduling for enhancing productivity and apply the FMS for the best output from the industry.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | General Concepts -Introduction to CIM concepts, scope of CIM, CIM wheel, Evolution of CIM, needs and benefits of CIM, CAD – benefits, Graphics standards, CAD software, Applications of NC, advantages and disadvantages of NC, CNC, advantages and functions of CNC, DNC, advantages and functions of DNC, Integration of CAD/CAM/CIM. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-II | Group Technology and Cellular Manufacturing: Concept of Group Technology and its Application, part families, part classification and coding, benefits of group technology; Clustering Techniques and Cellular Manufacturing. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Group Technology and Cellular Manufacturing: Concept of Group Technology and its Application, part families, part classification and coding, benefits of group technology; Clustering Techniques and Cellular Manufacturing. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Computer Aided Process Planning and Flexible Manufacturing System: Introduction, Methods of CAPP; Process Classifications and Selections, Process Sheet Documentation, CAD based Process Planning, Inventory management,; FMS concept, Scope of FMS, Type of FMS, FMS planning and implementation, FMS Scheduling, sequencing, FMS layout and essentials, application and benefits of FMS. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-IV | Computer Aided Production Management: Introduction, production planning and control (PPC) fundamentals, use of computer in PPC such as Aggregate Production Planning(APP), Master Production Schedule(MPS), Material Requirement Planning(MRP), Manufacturing Resource Planning(MRPII), Enterprise Resource Planning (ERP), basics of JIT. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-V | Automated Material Handling Systems and Monitoring and Quality Control: Industrial Robots, Conveyors, AGVs; Types of production monitoring system, process control and strategies, computer aided quality control, Objectives of CAQC, Integration of CAQC with CIM, basics of rapid prototyping. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 0 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | 1. Pandey P. C. , 2010, Production Engineering, Science Standard Publishers, 2. Ghosh and Mallick, Manufacturing Science, East west press |
| **Articles** | |
| **References Books** | 1. Groover M P, Fundamental of modern manufacturing: Materials, Processes, and System, John Wiley and Sons 2. Rao P. N., Manufacturing Technology, McGraw Hills |
| **MOOC Courses** | https://www.mooc-list.com/tags/computer-aided-manufacturing |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | - | - | - | 1 | 1 | - | 2 | 1 | 3 | 3 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | - | 1 | 3 | - | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | - | 1 | 2 | 2 | 2 | 2 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Non Destructive testing |
| **Course Code** | MEE0814 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of properties of material types and science. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember the basics principle of sciences and material science..**(BL1-Remember)**<br>**CO2-** Understand the basics fests of design of Non destructive testing**(BL2-Understand)**<br>**CO3-** Apply system of testing.**(BL3-Apply)**<br>**CO4-** Analyze the system of testing defect.**(BL4-Analyze)**<br>**CO5-** Evaluate the various testing and forgings for strengthening the products**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction Scope and advantages of NDT. Comparison of NDT with DT. Some common NDT methods used since ages, Terminology. Flaws and Defects, Visual inspection,Equipment used for visual inspection. Ringing test chalk test (oil whitening test).Attractive uses of above tests in detecting surface cracks, bonds trength & amp; surface defects. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-2 | Common NDT methods Die penetrate test (liquid penetrate inspection), Principle, scope. Equipment &techniques, Tests stations, Advantages, types of penetrant and developers. Illustrative examples – Heavy castings of large size, frame of jet engine, porosity testing of nickel alloys, leak testing. Zyglo test Magnetic particle Inspection – Scope , principle, Ferro Magnetic and Non-ferro magnetic materials, equipment & testing. Advantages, limitations Interpretation of results. DC & AC magnetization, Skin Effect, use of dye & wet powders for magna glow testing, different methods to generate magnetic fields, application. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-3 | Radiographic methods X-ray radiography principle, equipment & methodology. Applicability, types of radiations, limitations. Interpretation of Radiographs, limitations of γ-ray radiography – principle,equipment. Attenuation of electro magnetic radiations, source of radioactive materials &technique. Photo electric effect, Rayleigh's scattering (coherent scattering), Compton's scattering (Incoherent scattering). Pair production, Beam geometry, Scattering factor.Advantages of γ-ray radiography over X-ray radiography Precautions against radiation hazards. Case Study - X-ray of human body. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-4 | Ultrasonic testing methods Introduction, Principle of operation, Piezoelectricity. Ultrasonic probes, CRO techniques,advantages, Limitation & typical applications. Applications in inspection of castings, forgings, Extruded steel parts, bars, pipes, rails and dimensions measurements. Case Study – Ultrasonography of human body. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Eddy Current Inspection Principle, Methods, Advantages, Scope and limitations. Types of Probes. Case Studies. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | (1) ASM Handbook Vol. 11, 8 71th Edition – Non-destructive Testing & Evaluation |
| **Articles** | |
| **References Books** | (1) Research Techniques in NDT Vol.3, R.S. Shah, Academic (2) Industrial Quality Control, Webstar (3) Bray, Don E. and Stanley, Roderic K., Nondestructive Evaluation: A Tool in Design, Manufacturing, and Service. Revised Edition 1997, CRC Press New |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc20_mm07/preview1 |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | 1 | - | - | - | 1 | 2 | 1 | 1 | 1 | -1 | 2 | 1 |
| CO2 | 3 | 1 | 1 | 1 | 2 | 2 | - | - | - | - | 2 | 2 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 2 | - | - | 2 | 2 | - | - | - | - | 2 | 2 | 1 | 4 |
| CO4 | 3 | 3 | 2 | - | - | 2 | - | - | - | 1 | 2 | 1 | 2 | 1 | 1 |
| CO5 | 1 | 2 | - | 3 | 3 | - | - | - | 2 | 3 | - | 2 | 2 | 3 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Finite Element Method |
| **Course Code** | MEE0816 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences and machine design | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the concepts behind formulation methods in FEM**(BL1-Remember)**<br>**CO2-** Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements. **(BL2-Understand)**<br>**CO3-** Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced.**(BL3-Apply)**<br>**CO4-** Analyse element characteristic equation and generation of global equation**(BL4-Analyze)**<br>**CO5-** Develop element characteristic equation and generation of global equation. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Introduction-Different approaches in Finite Element Method - Direct Stiffness approach, simple examples, Variational approach, Elements of variational calculus - Euler Lagrange equation, Rayliegh Ritz method, Weighted Residual methods, Point Collocation method, Sub domain Collocation method, Galarkins method - Steps involved in FEM. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-II | Types of elements used Interpolation Polynomials - Linear elements Shape function - Analysis of simply supported beam - Element and Global matrices - Two-dimensional elements, triangular and rectangular elements - Local and Natural Co-ordinate systems. | Lectures with whiteboard/PPT, Quiz, Group discussion | |
| Unit-III | Finite element formulation of field problems Classification of partial differential equations - Quasiharmonic equation - Steady state problems - Eigen value problems - Propogation problems - Examples, Torsional problem - Fluid flow and Heat transfer problems - Acoustic vibrations. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-IV | Finite element formulation of solid mechanics problems Axial force member - element matrices for axial force members - Truss element analysis of pinned truss - Two dimensional elasticity problems | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-V | Numerical methods in fem Evaluation of shape functions - One dimensional & triangular elements, Quadrilateral elements, Isoperimetric elements - Numerical Integration, Gauss Legendre quadrature - Solution of finite element equations - Cholesky decomposition, Skyline storage - Computer implementation. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Larry J Segerlind ,“ Applied Finite Element Analysis”, John Wiley, 1984. 2. Bathe K.J., “Finite Element Procedures”, Prentice Hall, 1994. |
| **Articles** | |
| **References Books** | 3. Huebner and Thornton E.A., “The Finite Element Method for Engineers”, John |
| **MOOC Courses** | https://www.mooc-list.com/tags/finite-element-method |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Simulation and Modeling |
| **Course Code** | MEE0817 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of mechanical systems and computer programming | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** 1. To recall the basic system design of mechanical engineering systems**(BL1-Remember)**<br>**CO2-** 2. To understand the computer system simulation**(BL2-Understand)**<br>**CO3-** 3. To develop the model considering system and environment**(BL3-Apply)**<br>**CO4-** 4. To analyze the results of models.**(BL4-Analyze)**<br>**CO5-** 5. To evaluate the design through various software**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | PHYSICAL MODELING -Concept of system and environment, continuous and discrete system, linear and nonlinear system, stochastic activities, static and dynamic models, principles used in modeling, Basic simulation modeling, Role of simulation in model evaluation and studies, Advantages and Disadvantages of simulation. Modeling of Systems, Iconic analog; Mathematical Modeling | Lectures with PPT, Quiz, Group discussion, case study | |
| Unit-II | COMPUTER SYSTEM SIMULATION Technique of simulation, Monte Carlo method, experimental nature of simulation, numerical computation techniques, continuous system models, analog and hybrid simulation, feedback systems, Buildings simulation models of waiting line system, Job shop, material handling and flexible manufacturing systems | Lectures with PPT, Quiz, Group discussion, case study | |
| Unit-III | PROBABILITY CONCEPTS IN SIMULATION Stochastic variables, discrete and continuous probability functions, random numbers, generation of random numbers, variance reduction techniques, Determination of the length of simulation runs, Output analysis. | Lectures with PPT, Quiz, Group discussion, case study | |
| Unit-IV | SYSTEM DYNAMICS MODELING Identification of problem situation, preparation of causal loop diagrams and flow diagrams, equation writing, level and rate relationship; Simulation of system dynamics model | Lectures with PPT, Quiz, Group discussion, case study | |
| Unit-V | VERIFICATION AND VALIDATION Design of simulation experiments, validation of experimental models, testing and analysis. Simulation languages comparison and selection, study of SIMULA, DYNAMO, STELLA, POWERSIM; Simulation software | Lectures with PPT, Quiz, Group discussion, case study | |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Gordon G., System simulation, Prentice Hall. 2. Payer T.,Introduction to system simulation, McGraw Hill. 3. Spriet, Computer Aided Modeling and Simulation, W.I.A. |
| **Articles** | |
| **References Books** | 1. Sushil, System Dynamics, Wiley Eastern Ltd. 2. Shannon R.E., System simulation, Prentice Hall. 3.. Allan Carrie, " Simulation and Manufacturing", Jhon Wiley & Sons |
| **MOOC Courses** | https://www.my-mooc.com/es/mooc/simulation-and-modeling-of-natural-processes/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 |
| CO2 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 |
| CO3 | 1 | 1 | - | - | 1 | 1 | - | - | - | - | 1 | 1 | 2 | 2 | 2 |
| CO4 | 2 | 2 | 1 | - | 2 | 2 | 1 | - | 1 | - | 2 | 1 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 1 | 1 | 3 | 2 | 1 | - | 1 | - | 3 | 1 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Project Management |
| **Course Code** | MEE0818 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of industrial engineering and operation research. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** 1. To recall the managerial concepts.**(BL1-Remember)**<br>**CO2-** 2. To describe the project organization and cost estimation.**(BL2-Understand)**<br>**CO3-** 3. To develop the blueprint of the project.**(BL3-Apply)**<br>**CO4-** 4. To analyze the financial aspects of the project.**(BL4-Analyze)**<br>**CO5-** 5. To evaluate the project planning and modification of the network models.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Project Management Concepts: Introduction, project characteristics, taxonomy of projects, project identification and formulation. Establishing the project and goals. Nature & context of project management; phases of PM, A framework for PM issues, PM as a conversion process, project environment & complexity. Organizing human resources, organizing systems and procedures for implementation. Project direction | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-2 | Project Organization and Project Contracts: Introduction, functional organization, project organization, matrix organization, modified matrix organization, pure project organization, selection of project organization structure, project breakdown structures, project contracts, types of contracts, types of payments to contractors. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-3 | Project Appraisal & Cost Estimation: Introduction, technical appraisal, commercial appraisal, economic appraisal, financial appraisal, management appraisal, social cost/benefit analysis, project risk analysis. Cost analysis of the project, components of capital cost of a project, modern approach to project performance analysis. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-4 | Project Planning & Scheduling: Introduction to PERT & CPM, planning and scheduling networks, time estimation, determination of critical path, CPM model, event slacks & floats, PERT model, expected time for activities, expected length of critical path, calculating the project length and variance, PERT & CPM cost accounting systems, lowest cost schedule, crashing of networks, linear programming formulation of event oriented networks, updating of networks, LOB technique. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Modification & Extensions of Network Models: Complexity of project scheduling with limited resources, resource leveling of project schedules, resource allocation in project scheduling - heuristic solution. Precedence networking- examples with algorithm, decision networks, probabilistic networks, computer aided project management-essential requirements of PM software, software packages for CPM. Enterprise- wide PM, using spread sheets for financial projections. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Shtub, Bard and Globerson, Project Management: Engineering, Technology, and Implementation, PH Inc. 2. Lock, Gower, Project Management Handbook. 3. Cleland and King, VNR Project Management Handbook. 4. Wiest and Levy, Management guide to PERT/CPM, PHI. 5. Horald Kerzner, Project Management: A Systemic Approach to Planning, Scheduling and Controlling, CBS Publishers, 2002. 6. S. Choudhury, Project Scheduling and Monitoring in Practice. 7. P. K. Joy, Total Project Management: The Indian Context, Macmillan India Ltd. |
| **Articles** | |
| **References Books** | 1. John M Nicholas, Project Management for Business and Technology: Principles and Practice, Prentice Hall of India, 2002. 2. Smith N. J. (Ed), Project Management, Blackwell Publishing, 2002. 3. Robert K. Wysocki, Robert Back Jr. and David B. Crane, Effective Project Management, John Wiley, 2002. 4. Jack R Meredith and Samuel J Mantel, Project Management: A Managerial Approach, John Wiley, 4th Edition, 2000. |
| **MOOC Courses** | https://www.coursera.org/courses?query=project%20management |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 1 | 2 | - | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 |
| CO2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | - | 2 | 2 | 3 |
| CO3 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 2 | 3 | 3 | - | 3 | 2 | 3 |
| CO4 | 3 | 3 | 2 | 3 | 2 | - | - | - | 2 | 2 | 3 | - | 3 | 2 | 3 |
| CO5 | 3 | 3 | 2 | 3 | 2 | - | 2 | - | 2 | 2 | 3 | - | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Production and Operation Management |
| **Course Code** | MEE0819 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | knowledge of industrial engineering and operation research. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** 1. To recall the industrial engineering and management concepts.**(BL1-Remember)**<br>**CO2-** 2. To describe the production planning and control.**(BL2-Understand)**<br>**CO3-** 3. To develop the planning of resources and operations.**(BL3-Apply)**<br>**CO4-** 4. To analyze the financial aspects of the material procurement and maintenance management.**(BL4-Analyze)**<br>**CO5-** 5. To evaluate the Production planning and master scheduling.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Operations Management: Introduction, systems concept, decisions, organization, objectives and evolution of operations management, comparing production of tangible goods and services, operations strategy, type of production systems, role of production manager. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-II | Facilities Planning & Production Planning Control: Plant location, plant layout and material handling, layout analysis, procedures such as CORELAP, CRAFT etc. Organization and functions of PPC CAPP, make or buy decision, forecasting methods and its relationship with product life cycle, case studies. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-III | Aggregate Planning and Master Scheduling: Strategies of aggregate planning, graphic and charting methods, application of LP, master scheduling, job shop scheduling and sequencing algorithms Gantt chart, line balancing, LOB, case studies. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-IV | Maintenance Management: Types of maintenance strategies, breakdown, preventive and predictive maintenance, individual and group replacement policies, case studies. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-V | Materials Management: As part of supply chain, purchasing, stores and vendor selection, inventory models, selective inventory control, MRP, MRP-II, lot size techniques, just - in – time system of manufacturing, Kaizen, Total Productive Maintenance (TPM), BPR, SCM, ERP etc. and case studies. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | Hop W, Spearman M; Factory Physics; TMH 2. Charry S.N.; Production & Operations Management; TMH. 3. Chase, Acquilino, Production & Operations Managment, TMH. 4. Eilon S. Production Planning and Control, McMillon Pub. 5. Vollmann; Mfg planning and control for SCM; TMH |
| **Articles** | |
| **References Books** | 1.Nahmias Steven; Production and Operations analysis; TMH 2. Bedi Kaniska; Production and Operations Management; Oxford Pub 3. Dobler & Lee, Purchasing & Materials Management, PHI. 4. Chitle A.K., Gupta R.C. Materials Management, PHI. 5. Monk Joseph; Schaum's outline of Operations Management; McGraw Hill. |
| **MOOC Courses** | https://www.mooc-list.com/tags/operations-management |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 1 | 2 | - | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 |
| CO2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | - | 2 | 2 | 3 |
| CO3 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | - | 3 | 2 | 3 |
| CO4 | 3 | 3 | 2 | 3 | 2 | - | - | - | 2 | 2 | 3 | - | 3 | 2 | 3 |
| CO5 | 3 | 3 | 2 | 3 | 2 | - | 2 | - | 2 | 2 | 3 | - | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Machine learning for Robotics |
| **Course Code** | MEE0820 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences and machine design. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** 1. To recall the theoretical foundations of various learning algorithms.**(BL1-Remember)**<br>**CO2-** 2. To understand the context of supervised and unsupervised learning through real-life examples.**(BL2-Understand)**<br>**CO3-** 3. Apply all learning algorithms over appropriate real-time dataset.**(BL3-Apply)**<br>**CO4-** 4. Evaluate the algorithms based on corresponding metrics identified.**(BL4-Analyze)**<br>**CO5-** 5. Analyze the requirements of Machine Learning applications in context-aware robotic environment.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction to Machine Learning Introduction – Exploration – Learning Paradigms – Role of Machine Learning in Robotic applications | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-2 | Supervised Learning – I Linear and Non-Linear – Multi–Class & Multi-Label classification – Linear Regression – Multilinear Regression – Naïve Bayes Classifier – Decision Trees – ID3 – CART – Fine tuning of algorithms for robotic environment. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-3 | Supervised Learning – II K-NN classifier – Logistic regression – Perceptrons – Single layer & Multi-layer – Support Vector Machines – Linear & Non-linear – Error Bounds Fine tuning of algorithms for robotic environment. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-4 | Unsupervised Learning Real time Datasets – Pre-processing Clustering basics (Partitioned, Hierarchical and Density based) - K-Means clustering – K- Mode clustering – Principal Component Analysis – Kernel PCA - Error Bounds – Ensemble Learning (Random Forest, XGBoost) – Fine tuning of algorithms for robotic environment. Class Imbalance – SMOTE – One Class SVM – Optimization of hyperparameters. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Reinforcement Learning Robotics & Machine Learning Alliance Basics of RL – RL Framework – Markov Decision Process – Exploration Vs Exploitation Design constraints and considerations – setting up the environment – Applications and case studies in Robotics | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | | | | |

Part E

| | |
|---|---|
| **Books** | 1 Ethem Alpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014. 2 Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar "Foundations of Machine Learning", MIT Press, 2012. 3 Reinforcement Learning: An Introduction (Adaptive Computation and Machine Learning series) 2nd edition, Richard S. Sutton and Andrew G. Barto, A Bradford Book; 2018, ISBN 978-0262039246 |
| **Articles** | |
| **References Books** | 1 Tom Mitchell, “Machine Learning”, McGraw Hill, 3rd Edition, 1997. 2 Charu C. Aggarwal, “Data Classification Algorithms and Applications”, CRC Press, 2014. |
| **MOOC Courses** | https://www.mooc-list.com/tags/robotics |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 1 | - | 1 | 1 | 1 | 1 | - | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | - | - | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| CO4 | 3 | 2 | 3 | 2 | 3 | 3 | - | 1 | 1 | 2 | 3 | 2 | 2 | 2 | 3 |
| CO5 | 3 | 3 | 3 | 2 | - | - | - | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Measurement and Metrology |
| **Course Code** | MEL 0308[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | fundamental understanding of mathematics, particularly algebra and geometry, basic physics concepts such as mechanics and thermodynamics, familiarity with instrumentation and data analysis techniques, and a grasp of engineering principles. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember and understand the basic principle of applied physics, i.e., Unit of measurement, characteristics of instruments**(BL1-Remember)**<br>**CO2-** To understand the concept of generalized measurement system**(BL2-Understand)**<br>**CO3-** To apply the measurement of mechanical parameter such as pressure, force, torque, and strain in equipments**(BL3-Apply)**<br>**CO4-** To analyze the error in measurement system and tolerance**(BL4-Analyze)**<br>**CO5-** To evaluate the measurement of linear and angular measurement.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit -1 | Concept of measurement: General concept of measurement, Need for measurement, Generalized measuring system, Units, Standards, Sensitivity, Readability, Range of accuracy, Precision, Accuracy Vs precision, Uncertainty. repeatability and reproducibility, Errors in measurement, Types of error, Systematic and random error, Calibration, Interchangeability. | Lecture with white board/PPT, Audio/Video clips, group discussion, Physical model, quiz | 8 |
| Unit -2 | Linear and angular measurements: Linear measuring instruments: Vernier caliper, Micrometer, Interval measurements: - Slip gauges, Checking of slip gauges for surface quality, Optical flat, Application of limit gauges, limit fits and tolerances Comparators: - Mechanical comparators, Electrical comparator, Optical comparator, Pneumatic comparator, Sine bar, Use of sine bar, Limitations of sine bars, Sources of error in sine bars, Bevel protractor, Applications of bevel protractor. | Lecture with white board/PPT, Audio/Video clips, group discussio, Review Analysis | 8 |
| Unit -3 | Form measurement: Introduction, Screw thread measurement, Thread gauges, Measurement of gears: Gear errors, Surface finish measurement: -Introduction, Elements of surface texture, Analysis of surface finish, Methods of measuring surface finish, Straightness measurement, Flatness testing, Roundness measurements, Coordinate measuring machine (CMM):-Types of CMM, Features of CMM, Computer based inspection | Lecture with white board/PPT, Audio/Video clips, group discussion, , classroom presentations | 8 |
| Unit -4 | Measurement of power, flow and temperature related properties: - Measurement of force, Accelerometer, Load cells, Bourdon tube. Torque measurement: Torque measurement using strain gauges, Torque measurement using torsion bars, Mechanical dynamometers | Lecture with white board/PPT, Audio/Video clips, group discussion, quiz | 8 |
| Unit -5 | Measurement of flow: Variable area meters – rotameter, Hot wire anemometer, Pitot tube. Temperature measurement, Bimetallic strip, Thermocouples (Thermo electric effects), Thermistors, Pyrometers. | Lecture with white board/PPT, Audio/Video clips, group discussion, quiz | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | MEASUREMENT WITH SCALE AND VERNIER CALIPERS | Experiments | BL3-Apply | 2 |
| Experiment -2 | MEASUREMENT WITH MICROMETERS | Experiments | BL3-Apply | 2 |
| Experiment -3 | STUDY AND USE OF SLIP GAUGES | Experiments | BL2-Understand | 2 |
| Experiment -4 | MEASUREMENT OF ANGLE WITH SINE BAR AND HEIGHT GAUGE | Experiments | BL4-Analyze | 2 |
| Experiment -5 | STUDY OF INSPECTION GAUGES SUCH AS PLUG, SNAP, AND THREAD GAUGES | Experiments | BL2-Understand | 2 |
| Experiment -6 | MEASUREMENT OF ANGLES WITH BEVEL PROTRACTOR | Experiments | BL3-Apply | 2 |
| Experiment -7 | MEASUREMENT WITH COMBINATION SET | Experiments | BL3-Apply | 2 |
| Experiment -8 | MEASUREMENT WITH DIAL INDICATOR USING SURFACE PLATE AND ACCESSORIES | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Kumar, D. S. (2012). Mechanical Measurements & Control. New Delhi: Metropolitan Publications.<br>Raghavendra, N. S. (2018). Metrology and Measurements. Pearson Education India. |
| **Articles** | |
| **References Books** | Sawhney, A. K. (1994). Mechanical Measurements & Instrumentation. New Delhi: Dhanpat Rai & Sons.<br>Hume, D. R., & Hume, E. (2015). Metrology and Measurement. CRC Press. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106138/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Mechanics of Solids |
| **Course Code** | MEL 0310[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | a complete description of the geometry of the member, its constraints, the loads applied to the member and the properties of the material of which the member is composed. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remembering the concept of physics and engineering mechanics **(BL1-Remember)**<br>**CO2-** Understanding the rigid and deformed bodies**(BL2-Understand)**<br>**CO3-** Applying the concept of engineering to calculate stress strain value**(BL3-Apply)**<br>**CO4-** To analyze the deformation of body under action of force**(BL4-Analyze)**<br>**CO5-** To evaluate the results through testing of component/material.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Stress and strain; normal, shear and bearing stresses; normal and shear strain, modulus of Elasticity, Poisson's ratio, Elastic and Bulk modulus, relation between elastic constants, deformation of axial members, tensile tests for ductile and brittle materials, yield strength, yield criteria, ultimate strength, factor of safety, mechanical properties, temperature stresses in simple and composite members. | Lecture with white board and PPT, Quiz, Seminar, Poster | 10 |
| 2 | Strain energy due to axially applied loads (gradual, sudden and impact loads). State of stress, Generalized Hook's Law, stress transformation, principal planes, principal stresses and strains, maximum shear stress, Mohr's Circle representation for stress and strains | Lecture with white board and PPT,Quiz, Seminar, Poster | 10 |
| 3 | Theories of failures and its assumptions. Bending of beams: Pure bending, bending of beams with symmetric cross section, composite cross sections, shear stress in beams, deflection in beams by different methods for various boundary conditions | Lecture with white board and PPT,Quiz, Seminar, Poster | 8 |
| 4 | Torsion of Shafts: Torsional Moment Diagram, torsion formula for solid and hollow shafts, maximum normal and shear stress, angle of twist, combined effect of axial load, bending moment and torsional moment on circular shafts. Elastic Stability: Euler buckling, equivalent length, Rankine formula, eccentric loading. | Lecture with white board and PPT,Quiz, Case writing, seminar | 8 |
| 5 | Pressure Vessels: Thin and Thick walled pressure vessels; radial, axial and circumferential stresses, maximum shear stress, volumetric strain. Compound cylinder. Leaf spring, Stress and defection in open helical spring. | Lecture with white board and PPT,Quiz, Case writing, seminar | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To study the mechanical Properties of metals | Experiments | BL2-Understand | 03 |
| 2 | To perform torsion test on mild steel rod | Experiments | BL3-Apply | 03 |
| 3 | To determined impact strength of steel (charpy test) | Experiments | BL4-Analyze | 03 |
| 4 | To determined impact strength of steel (izod test) | Experiments | BL3-Apply | 03 |
| 5 | To determine brinell hardness numbers for mild steel | Experiments | BL4-Analyze | 03 |
| 6 | To determine the rock well hardness numbers for steel | Experiments | BL5-Evaluate | 03 |
| 7 | To determine the tensile strength of mild steel | Experiments | BL6-Create | 03 |
| 8 | Analysis of simply supported beam with ANSYS | Experiments | BL6-Create | 03 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Timushenko. S. P. and Young, Strength of Material, East-West Press. Beer, Johnston & Dewolf, Mechanics of Materials, Tata McGraw-Hill Education R K Bansal, Strength of Material, Laxmi Publication |
| **Articles** | |
| **References Books** | A. Pytel, and J Kiusalaas, Mechanics of Materials, CENGAGE Learning, 2012 G.H. Ryder, Strength of Materials, MACMILAN, 1969 Popov, Strength of Materials, PHI, New Delhi. Crandell, Dhal and Lardner, Introduction to Mechanics of Solids, McGraw Hill |
| **MOOC Courses** | https://www.coursera.org/courses?query=mechanics%20of%20materials |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 3 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | - | 1 | 2 | 2 | - | 2 | 2 | - | - | 2 | - | 3 | 3 | 3 | 3 |
| CO4 | 1 | 2 | 2 | 2 | 2 | - | 2 | 2 | - | - | 2 | 1 | 3 | 2 | 3 |
| CO5 | - | - | - | 1 | 1 | 3 | - | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Additive Manufacturing |
| **Course Code** | MEL 0627[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Understanding of the concept of design knowledge of CAD. Understanding of the concept of material and manufacturingg. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the fundamental principles of additive manufacturing.**(BL1-Remember)**<br>**CO2-** To understand the fundamental principles of additive manufacturing.**(BL2-Understand)**<br>**CO3-** To apply appropriate material selection criteria for different additive manufacturing applications.**(BL3-Apply)**<br>**CO4-** To compare and contrast different additive manufacturing processes based on their strengths and weaknesses**(BL4-Analyze)**<br>**CO5-** To evaluate strategies for integrating additive manufacturing into existing manufacturing systems for improved efficiency and productivity.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG12(Responsible consuption and production) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction and Basic Principles Rapid prototyping and tooling, prototype fundamentals-types of prototypes, History of RP system, development of rapid prototyping, fundamentals of rapid prototyping, Tooling. Three Phases of Development, advantages of rapid prototyping, direct benefits, indirect benefits. Trends in manufacturing, Conventional Machining, Processes- Development of a CAD model, Generation of STL Files, Slicing the STL fileSupport Structures, Manufacturing, Post processing. Fundamentals, need, advantages, disadvantages, benefits, Complexity, Accuracy, Geometry Additive Manufacturing, AM Parts, uses, The Generic AM Process, Layer-Based Manufacturing, 3D Printing, Benefits of AM, Distinction Between AM and CNC Machining, Practical Example AM Parts | Lectures with white board/PPT, Quiz, Group discussion | 8 |
| Unit-2 | Development of Additive Manufacturing Technology Introduction, Computers, Computer-Aided Design Technology, Other Associated Technologies, The Use of Layers, Classification of AM Processes, Metal Systems, Hybrid Systems, Milestones in AM Development,, AM Around the World, Rapid Prototyping ,Direct Digital Manufacturing | Lectures with white board/PPT, Quiz, Group discussion | 8 |
| Unit-3 | Liquid-Based Systems 3D Systems Stereolithography Apparatus (SLA), Models and Specifications, Advantages and Disadvantages, Process, Principle, Photopolymers, Photopolymerization, Layering Technology, Solid Ground Curing (SGC), Introduction, Highlights Process Machine Details Applications. | Lectures with white board/PPT, Quiz, Group discussion | 8 |
| Unit-4 | Solid-Based Rapid Prototyping Systems Fused Deposition Modelling. Modelling System Hardware, Software, Build Materials, The Extrusion Head, Drive Blocks, The Heating Chamber Tips Build Substrate Fused Deposition Modelling Operation Orientation/Positioning Slicing, Build Parameters Uses of Fused Deposition Modelling Parts Advantages and Disadvantages Key Terms Laminated Object Manufacturing, System Hardware, Laminated Object Manufacturing Operation, Software, Part Orientation Crosshatching System Parameters Laminated Object Manufacturing Build Technique, Finishing a Laminated Object Manufacturing Part, Uses of Laminated Object Manufacturing Advantages and Disadvantages Materials Properties | Lectures with white board/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Powder-Based Rapid Prototyping Systems Selective Laser Sintering, Selective Laser Sintering Technology, Purpose, Current State, Advantages, High Throughput Capability, Self- Supporting Build Envelope, Purpose, applications, advantages, Disadvantages, Powder Bed Fusion Processes, Materials Various other Techniques | Lectures with white board/PPT, Quiz, Group discussion | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Study of Rapid Prototyping and Tooling. | Experiments | BL4-Analyze | 2 |
| Experiment -2 | Study of Layered Manufacturing (LM). | PBL | BL4-Analyze | 2 |
| Experiment -3 | Study of Laminated Object Manufacturing (LOM).Laminated Object Manufacturing | Experiments | BL4-Analyze | 2 |
| Experiment -4 | To study about selective laser sintering | Experiments | BL4-Analyze | 2 |
| Experiment -5 | Study of Shape Deposition Manufacturing Process Description | Experiments | BL4-Analyze | 2 |
| Experiment -6 | Study and demonstration of 3D | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Chua C.K., Leong K.F., and Lim C.S Rapid prototyping: Principles and applications, Third edition, World Scientific Publishers,<br>Gebhardt A Rapid prototyping Hanser Gardener Publications, |
| **Articles** | |
| **References Books** | Kamrani A.K. and Nasr E. A Rapid Prototyping: Theory and practice Springer<br>Liou L.W. and Liou F.W Rapid Prototyping and Engineering applications: A tool box for prototype development CRC Press |
| **MOOC Courses** | https://www.coursera.org/courses?query=additive%20manufacturing |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 2 | - | 2 | - | - | - | - | - | - | 2 | 3 | 3 | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | 2 | - | - | - | 1 | 3 | 1 | 3 | 3 | 3 |
| CO3 | - | 1 | - | 3 | 2 | 2 | - | 1 | - | 1 | 3 | 3 | 2 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | - | - | 1 | - | 2 | 2 | - | 3 | - | 3 |
| CO5 | - | 3 | 3 | 3 | 3 | - | - | - | - | 3 | 3 | 2 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Engineering Mechanics |
| **Course Code** | MEL0101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Foundation core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic sciences | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 Remember the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions**(BL1-Remember)**<br>**CO2-** CO2 Understand the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions.**(BL2-Understand)**<br>**CO3-** CO3 Apply system of forces in the belts drive systems as power transmission devices, shafts and beams.**(BL3-Apply)**<br>**CO4-** CO4 Analyze the beams and trusses with centre of mass and moment of inertia.**(BL4-Analyze)**<br>**CO5-** CO5 Evaluate shear force and bending moment in designing of shafts and beams and trusses.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction of Engineering Mechanics Basic concepts of system of forces- Coplanar Concurrent Forces - Components in Space – Resultant Moment of Forces and its Application - Couples and Resultant of Force System - Equilibrium of System of Forces- Free body diagrams- Equations of Equilibrium of Coplanar Systems and Spatial Systems. | Lectures with whiteboard/PPT, Quiz, Group discussion | 9 |
| Unit-2 | Friction Types of friction, Limiting friction, Laws of Friction, static and Dynamic Friction. Motion of Bodies - Wedge, Ladder and Screw jack. | Lectures with whiteboard/PPT, Quiz, Group discussion | 7 |
| Unit-3 | Transmission of Power Belt Drivers - Open, Crossed and compound belt drives, length of belt, tensions- tight side and slack side, Power transmitted and condition for maximum power. | Lectures with whiteboard/PPT, Quiz, Group discussion | 7 |
| Unit-4 | Center of Gravity & Moment of Inertia: Centroids - Centroids of Composite figures - Centre of Gravity of Bodies - Area moment of Inertia: - polar Moment of Inertia - Transfer - Theorems - Moments of Inertia of Composite Figures, Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia.. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Shear Force & Bending Moment Diagrams & Trusses: Support Reactions, Shear force and bending moment Diagram for Cantilever & simply supported beam with concentrated, distributed load and Couple. Application of Equilibrium Concepts. Trusses- types, method of joints and method of moments. | Lectures with whiteboard/PPT, Quiz, Group discussion | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | 1. To verify the law of Triangle of forces and Lami's theorem. | Experiments | BL3-Apply | 2 |
| Experiment-2 | 2. To verify the law of parallelogram of forces | Experiments | BL3-Apply | 2 |
| Experiment-3 | 3. To verify law of polygon of forces | Experiments | BL3-Apply | 2 |
| Experiment-4 | 4. To find the support reactions of a given truss and verify analytically. | Experiments | BL3-Apply | 2 |
| Experiment-5 | 5. To determine support reaction and shear force at a given section of a simply supported beam and verify in analytically using parallel beam apparatus. | Experiments | BL3-Apply | 2 |
| Experiment-6 | 6. To verify bending moment at a given section of a simply supported beam. | Experiments | BL3-Apply | 2 |
| Experiment-7 | 7. To find coefficient of friction on horizontal and inclined planes. | Experiments | BL3-Apply | 2 |
| Experiment-8 | 8. To determine centre of gravity of different shapes. | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Engineering Mechanics by Dr. D.S. Kumar, S.K. Kataria & sons, latest edition. Engineering Mechanics by R. K. Rajput, S.Chand & Co. Engineering Mechanics: Statics & Dynamics by R.C. Hibbler |
| **Articles** | |
| **References Books** | • Engineering Mechanics- statics dynamics by Boresi & Schmidt, Thomson Books • Engineering Mechanics - Schaum's series - Mc.Grawhill Publications. • Engineering Mechanics by S. Timashenko, D.H. Young and J.V. Rao |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106286/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | 1 | - | - | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 1 | 1 | - | 1 | 3 | - | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | - | 1 | 2 | 1 | 1 | 1 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | - | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Material Science |
| **Course Code** | MEL0104[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | The field of materials science is broad and subsumes aspects of physics, chemistry, mechanics, and more. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Recall the crystal structure and classification of materials**(BL1-Remember)**<br>**CO2-** Understating the concept of advanced finishing processes, understand mechanical properties and their application.**(BL2-Understand)**<br>**CO3-** To implement the phase diagram of materials**(BL3-Apply)**<br>**CO4-** To analyze the heat treatment process to achieve desired properties of metals and alloy.**(BL4-Analyze)**<br>**CO5-** To evaluate type of materials that are used in engineering with special emphasis on steel/ ferrous materials**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction, Atomic models, Chemical bonding, Crystallography and Imperfections, Concept of unit cell, Space lattice, Crystal lattices, Common crystal structures, Atomic packing factor and density, Miller indices, Defects & imperfections in solids. Mechanical Properties: Stress-Strain Diagram, Ductile & Brittle Material, Strength, Toughness, Hardness, Fracture, Fatigue and Creep. | Lectures with whiteboard and PPT,Report writing | 8 |
| Unit-2 | Plastic Deformation of Metals: Hot working, Cold working, Re-crystallization & grain growth. Phase Diagram and Equilibrium Diagram: Unary and Binary diagrams, Phase rules. Types of equilibrium diagrams, Iron-carbon equilibrium diagram, Solid solutions, eutectic and combination type. | Lectures with whiteboard and PPT,Quiz, Seminar, Poster | 8 |
| Unit-3 | Ferrous Materials: Various types of carbon steels, alloy steels and cast irons, its properties and uses. Heat Treatment: Various types of heat treatment such as Annealing, Normalizing, Quenching, Tempering and Case hardening. Time Temperature Transformation (TTT) diagrams. | Lectures with whiteboard and PPT,Quiz, Report writing | 8 |
| Unit-4 | Non-Ferrous metals and alloys such as Cu, Al, Zn, Cr, Ni, etc. and their applications. Various types: Brass, Bronze, bearing materials, its properties and uses. Aluminum alloys such as Duralumin. Ceramics: Structure types and properties and applications of ceramics. | Lectures with whiteboard and PPT,Abstract of research paper | 8 |
| Unit-5 | True stress-strain, elastic recovery and plastic deformation. Strain Quiz, Case writing, seminar hardening, recovery, recrystallization, grain growth. Powder metallurgy: introductory concept & processes. | Lectures with whiteboard and PPT,Quiz, Case writing, seminar | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | 0 | | | |

Part E

| | |
|---|---|
| **Books** | Material Science & Processes, Media Promoters & Publishers Narula - Material Science, TMH |
| **Articles** | |
| **References Books** | 1. W. D. Callister, Jr, - Material Science & Engineering Addition, Wiley Publishing Co. 2. Van Vlash - Elements of Material Science & Engineering, John Wiley & Sons. 3. V. Raghvan - Material Science, Prentice Hall of India 4. Srivastava & Srinivasan - Science of Materials Engineering, New Age Publishers |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/113/102/113102080/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | - | 1 | 3 | 2 | - | 2 | 2 | 2 | - | - | - | 3 | 3 | 3 | 2 |
| CO4 | - | 2 | 1 | 3 | 2 | - | - | 1 | - | - | 2 | 1 | 2 | - | 2 |
| CO5 | - | - | - | - | - | 3 | - | - | - | - | 2 | - | 1 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Engineering Graphics |
| **Course Code** | MEL0202[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of geometrical construction, sketching, imagination etc. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To get the fundamentals of engineering graphics, geometrical construction and its applications.**(BL1-Remember)**<br>**CO2-** To understand the basic concept of engineering graphics through real-life examples. **(BL2-Understand)**<br>**CO3-** To implement the different engineering graphics concepts over appropriate drawing dataset. **(BL3-Apply)**<br>**CO4-** To analyze the drawing performance of engineering graphics techniques.**(BL4-Analyze)**<br>**CO5-** To evaluate the drawing performance of engineering graphics techniques on a corresponding object.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | 1. Drafting tools, 2. Principles of Graphics, 3. Geometrical constructions 4. Scales: Plain, diagonal, 5. Curves used in engineering practice: such as ellipse, parabola, hyperbola by different methods. Cycloidal curves, Involutes and Spirals. | Lecture with Whiteboard, PPT | 8 |
| Unit-2 | 1. Types of projection, Orthographic projections, First angle and third angle projection. 2. Projections of points in different quadrants. Projections of lines, True inclination and true length of straight line, Traces. | Lecture with Whiteboard, PPT | 8 |
| Unit-3 | Projections of planes: Perpendicular plane, oblique plane and Auxiliary plane, projection of planes with inclined to one or both the reference planes and traces of planes. | Lecture with Whiteboard, PPT | 8 |
| Unit-4 | 1. Projection of solids: Polyhedron and solids of revolution, projection of solids with inclined to one or both the reference planes. 2. Introduction to Section of solids and Development of surfaces. | Lecture with Whiteboard, PPT | 8 |
| Unit-5 | 1. Isometric projection: Isometric scale, isometric projections from orthographic drawing. 2. Computer Aided Drafting (CAD): Introduction, benefit, software's, basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD. | Lecture with Whiteboard, PPT | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Drawing sheet of plane scale. | Experiments | BL3-Apply | 2 |
| Experiment -2 | Drawing sheet of diagonal scale. | PBL | BL3-Apply | 2 |
| Experiment -3 | Drawing sheet of ellipse. | PBL | BL3-Apply | 2 |
| Experiment -4 | Drawing sheet parabola and hyperbola | PBL | BL3-Apply | 2 |
| Experiment -5 | Drawing sheet of cycloidal curves. | PBL | BL3-Apply | 2 |
| Experiment -6 | Drawing sheet of orthographic projection | | BL3-Apply | 2 |
| Experiment -7 | Drawing sheet of projection of line | | BL3-Apply | 2 |
| Experiment -8 | Drawing sheet of projection of plane. | | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. N.D.Bhatt Elementary of Enginnering Drawing Charotar Publication<br>P.S. Gill Engineering Drawing Kataria Publication<br>Agrawal and Agrawal Engineering Drawing TMH |
| **Articles** | |
| **References Books** | Venu Gopal K Engineering Drawing New age<br>K.L. Narayana& P. Kannaiah Engineering Drawing SCITECH Pub. |
| **MOOC Courses** | https://nptel.ac.in/courses/112103019 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 2 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | - | - | 2 | 1 | 1 | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Manufacturing Technology-I |
| **Course Code** | MEL0240[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of properties of Materials, types of manufacturing process, concepts of force and Pascal's law, surface tension capillarity. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall basic principles of sciences and material science.**(BL1-Remember)**<br>**CO2-** To describe the basic concept of casting and welding processes.**(BL2-Understand)**<br>**CO3-** To implement basic knowledge in analyzing the forces and processes of welding and casting.**(BL3-Apply)**<br>**CO4-** To analyze the welding and casting processes**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the analysis in optimizing the casting and welding processes.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit – 1 | Casting: Patterns and Pattern making, basic principle of casting process, types of patterns and allowances, types and properties of molding sand, sand perperation and control, element of mould, gating, riser, runners, cores and core making, solidification of casting, role of chilling | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit – 2 | Casting Processes: Sand castings, pressure die casting, permanent mould casting, centrifugal casting,precision investment casting, shell Moulding, CO2 Moulding, electro slag casting, Fettling and finishing, defects in Castings, Casting of non-ferrous materials. Melting and Pouring: Melting furnaces- crucibles oil fired furnaces, electric furnaces, cupola furnace, selection of furnace. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit – 3 | Basic Joining process- Types of welding-gas welding, -arc welding,-shielded metal arc welding, GTAW, GMAW, SAW, ESW-Resistance welding (spot, seam, projection, percussion, flash types)-atomic hydrogen arc welding-thermit welding. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit – 4 | Welding Process-Special Welding Processes: Soldering, brazing and their applications, welding of special materials– Stainless steel, Aluminium etc. weldability of cast iron, steel, stainless steel, aluminium alloys. Introduction to Electron beam and Laser welding, Flame cutting - Use of Oxyacetylene, modern cutting processes, arc cutting, Pre welding and post welding. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit – 5 | Design of Weldments: Welding symbols, Positions of welding, joint and groove design, heat input, effect of welding parameters, preheating and post heating, Selection of electrodes, flux etc. Weldments Testing: Inspection of welds – destructive and non-destructive testing methods, Defects in welding, causes and remedies. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Pattern design and making –for one casting drawing. | Experiments | BL3-Apply | 2 |
| Experiment -2 | Sand properties testing exercise for strengths and permeability | Experiments | BL3-Apply | 2 |
| Experiment -3 | Moulding melting and casting process. | Experiments | BL3-Apply | 2 |
| Experiment -4 | Arc welding- lap & butt joint preparation. | Experiments | BL3-Apply | 2 |
| Experiment -5 | spot welding joint prepapartion. | Experiments | BL3-Apply | 2 |
| Experiment -6 | To perform TIG welding. | Experiments | BL3-Apply | 2 |
| Experiment -7 | To perform Plasma welding and brazing process | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. Rao P N, Manufacturing Technology, McGraw Hill. 2. M. P. Groover, Fundamental of modern manufacturing: Materials, Processes and System, John Wiley and Sons |
| **Articles** | |
| **References Books** | 1. Pandey P C "Production Engineering Science" Standard publishers 2. Little Richard L. "Welding& Welding Technology" Tata McGraw Hill |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc24_me48/preview |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | - | - | 3 | 3 | 1 | 1 | 1 | 3 | 3 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | - | 1 | 1 | 3 | 3 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | - | - | - | 3 | 3 | 2 | 2 | 2 |
| CO4 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Basic Thermodynamics |
| **Course Code** | MEL0305[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | An introductory background in chemistry, physics, and calculus | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the energy and its transformation**(BL1-Remember)**<br>**CO2-** To understand energy conservation techniques**(BL2-Understand)**<br>**CO3-** To apply the oncept of energy transformation in heat and work systems**(BL3-Apply)**<br>**CO4-** To analyze power producing devices**(BL4-Analyze)**<br>**CO5-** To evaluate model for optimal power output**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Thermodynamics, Property, Equilibrium, State, Process, Cycle, Zeroth law of thermodynamics, statement and significance, concept of an Ideal gas,, Gas laws, Avogadro's hypothesis, Real gas, Deviation with ideal gas. Vander-wall's equation, evaluation of its constants, limitations of the equat. The law of corresponding states, Compressibility factor,generalized compressibility chart, P-V-T surface of a Real gas. | Lectures with whiteboard/PPT, Quiz, Group discussion | 10 |
| 2 | Pure Substance, Phase, Phase-transformations formation of steam, properties of steam, PVT surface HS, TS, PV, PH, TV diagram, measurement of dryness fraction of vapor.Use of steam table and Mollier chart, Gibbs and Helmholtz functions | Lectures with whiteboard/PPT, Quiz, Group discussion | 10 |
| 3 | First law of thermodynamics, Statement of first law of thermodynamics first law applied to closed system,, first law applied to a closed system undergoing a cycle processes analysis of closed system, flow process, flow energy,steady flow process,Relations for flow processes, limitations of first law of thermodynamics | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| 4 | Second law of thermodynamics, heat engine, heat reservoir Refrigerator, heat pump, COP, EPR, Available energy, Carnot's theorem, Carnot's cycle, efficiency of Carnot's cycle,statement of second law, Reversible and irreversible processes, consequence of second law, Entropy, Entropy change for ideal gas, T- S diagrams, Availability and Irreversibility, exergy, Gibbs and Helmholtz functions, Entropy of universe | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| 5 | Air standard cycles, --Otto, Diesel, Dual cycles and their comparison, MEP and Efficiency, Brayton cycle, Vapor power cycles-- Power generation by steam, Carnot cycle, Rankin cycle, reheat & regenerative cycles | Lectures with whiteboard/PPT, Quiz, Group discussion | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To Study of part of engine | Experiments | BL2-Understand | 03 |
| 2 | To study the construction and working of 2 stroke petrol engines | Experiments | BL2-Understand | 03 |
| 3 | To study the construction and working of 2 stroke diesel engines | Experiments | BL3-Apply | 03 |
| 4 | To study the construction and working of 4 stroke petrol engines | Experiments | BL4-Analyze | 03 |
| 5 | To study the construction and working of 4 stroke diesel engines | Experiments | BL2-Understand | 03 |
| 6 | To study of reciprocating pump | Experiments | BL3-Apply | 03 |
| 7 | To study of centrifugal pump | Experiments | BL3-Apply | 03 |
| 8 | To study the working of Vapor compression refrigeration test rig | Experiments | BL2-Understand | 03 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. P. K. Nag Engineering Thermodynamics, TMH 4thEdition 2 D. S. Kumar Thermal Science & Engineering 5th Edition 3 Onkar Singh Applied Thermodynamics by New Age |
| **Articles** | |
| **References Books** | 1 R. E. Sonntag, C. Borgnakke, and G.J. Van Wyle Fundamentals of Thermodynamics 5thEdition 2 Arora C. P Thermodynamics, TMH 1stEdition 3 Yunus A. Ceingel, Michael A. Boles Thermodynamics" TMH 5thEdition |
| **MOOC Courses** | https://www.coursera.org/courses?query=thermodynamics |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | - | 1 | 3 | 2 | 1 | 2 | 2 | 2 | - | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 2 | 2 | 3 | 2 | - | - | 2 | - | - | 2 | 1 | 3 | 2 | 2 |
| CO5 | - | - | - | - | 1 | 2 | - | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Fluid mechanics |
| **Course Code** | MEL0407[T] |

Part A

| | | | | | L | T | P | C |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Vector calculus, ordinary and partial differential equations, some exposure to complex variables. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Definitions of fluid, Types of fluid, Fluid Properties, velocity of sound ideal fluid viscosity, effect of temperature and pressure on viscosity, surface tension capillarity, vapour pressure and cavitation. Fluid Statics: Pascal's law, hydrostatics manometry, fluid forces on submerged plain and curved surfaces, The international standard atmosphere, metacentric height, stability, submerged bodies, floating bodies. | Lectures with white Boad, Assignment , PBL | 10 |
| 2 | Kinematics and conservation of Mass: Flow classifications, fluid velocity and acceleration, streamlines and the stream function. pathlines and streak lines. Deformation of a fluid element, vorticity and circulation. Types of flow, Flownet, Laplace equation, continuity equation. Fluid Momentum: Euler's Momentum theorem, applications of the momentum theorem, Bernoulli's equation. Applications of Bernoulli's Eqn: Pitot tube, Orifice meter, Nozzle, Venturimeter. | Lectures with white Boad, Assignment , PBL | 10 |
| 3 | Laminar Flow: Hagen Poiseuille flow, Plane Poiseuille flow and couette flow. Flow Through Pipes: Reynold's experiment, Darcy's Weisback equation. Major and Minor losses, Total and Hydraulic gradient lines, Flow through pipe line. Pipes in series, parallel; transmission of power through pipes. | Lectures with white Boad, Assignment , PBL | 8 |
| 4 | The Boundary Layer: Description of the boundary layer. Boundary Layer thickness, boundary layer separation and control. The Prandtl boundary layer equation. Solution for laminar boundary layer. The momentum equation for the boundary layer. The flat plate in uniform free stream with no pressures gradients. Dimensional Analysis: Buckingham variables, Model Similitude, Force ratio, Dimensionless numbers and their applications. Undistorted model distorted model scale effect. | Lectures with white Boad, Assignment , PBL | 8 |
| 5 | Turbulent Flow: Variation of friction factor with Reynold's number. The Prandtl Mixing length hypothesis applied to pipe flow, velocity distribution in smooth pipes, rough pipes. Computational Fluid Dynamics: What, When, and Why?, CFD Advantages and Applications, Fundamental principles of conservation, Reynolds transport theorem, Conservation of mass, Conservation of linear momentum. Simple solution of Navier Stokes equations (without derivation). Finite difference methods | Lectures with white Boad, Assignment , PBL | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To determine Cv, Cc and Cd for orifice meter | Experiments | BL3-Apply | 3 |
| 2 | To determine Cv, Cc and Cd for venturi meter | Experiments | BL2-Understand | 3 |
| 3 | Find the losses due to friction in pipe | Experiments | BL4-Analyze | 3 |
| 4 | Find the losses due to pipe fitting. | Experiments | BL4-Analyze | 3 |
| 5 | Find the Cd for Nozzle meter. | Experiments | BL5-Evaluate | 3 |
| 6 | Find the meta-centric height. | Experiments | BL2-Understand | 3 |
| 7 | Find the Cd for different type of Notches. | Experiments | BL3-Apply | 3 |
| 8 | To Draw performance curve for forced vortex flow | Experiments | | 3 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Engineering Fluid Mechanics, K. L. Kumar, Eurasia Publishing House Pvt. Ltd. Fluid Mechanics and Machines, F.M. White, John Wiley & Sons Fluid Mechanics and Machines, A. K. Jain Fluid Mechanics, V. L. Streeter, McGraw Hill Fluid Mechanics and Hydraulic Machines, R. K. Bansal, Laxmi Publication New Delhi Fluid Mechanics with Applications, S. K. Gupta V. Gupta, New Age Publications |
| **Articles** | |
| **References Books** | Fluid Mechanics for Chemical engineers, Noel de Nevers, Mc Graw HillII Edition 1991 Fluid mechanics for chemical engineers, James O Wikes and Stacy G. Bikes, Prentice Hall. |
| **MOOC Courses** | https://www.mooc-list.com/tags/fluid-mechanics |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 3 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | - | 1 | 3 | 3 | 1 | 2 | 2 | 2 | - | 2 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 2 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 1 | 3 | 2 | 2 |
| CO5 | - | 1 | - | - | 2 | 3 | - | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Industrial Engineering |
| **Course Code** | MEL0409[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic science and production engineering. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the concepts of work and motion study**(BL2-Understand)**<br>**CO2-** Apply the concepts of work and motion study to improve productivity.**(BL3-Apply)**<br>**CO3-** Describe the methods of job evaluation and wage incentive.**(BL5-Evaluate)**<br>**CO4-** Understand and apply methods of inspection and quality control.**(BL3-Apply)**<br>**CO5-** Understand and apply PERT and CPM.**(BL3-Apply)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Productivity & Work Study Definition of productivity, work content, ineffective time, productivity and standard of living, introduction to work Study Method Study: Objectives and procedure for methods analysis, recording techniques, principles of motion economy, micro-motion and Macro-motion study, Therbligs and SIMO Chart. | Lectures with Problem solving methodology, Quiz, Group discussion | 8 |
| Unit-2 | Work Measurement Objectives, work measurement techniques, time study, work sampling, pre-determined motion time standards (PMTS), determination of time standards, observed time, basic time, normal time, rating factors, allowances, and standard time. Introduction to ergonomics. | Lectures with Problem solving methodology, Quiz, Group discussion | 8 |
| Unit-3 | Job Evaluation and Wage Plan Objective, methods of job evaluation, job evaluation procedure, merit rating (performance appraisal), method of merit rating, wage and wage incentive plans. | Lectures with Problem solving methodology, Quiz, Group discussion | 8 |
| Unit-4 | Inspection and Statistical Quality Control: Quality, quality control, costs of quality, inspection and quality control, SQC concept, variable and attributes, normal distribution curves and control charts for variable and attributes and their applications and interpretation (Analysis) process capability. Acceptance sampling, sampling plans, OC Curves and AOQ curves. | Lectures with Problem solving methodology, Quiz, Group discussion | 8 |
| Unit-5 | Project Management Introduction to project management, Collaborative Working, PM Tutorials, Product development cycle overview; Market demands and trends for products; Product Lifecycle Management (PLM); Intellectual Property Rights (IPRs). | Lectures with Problem solving methodology, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. O.P. Khanna Industrial Engineering and Management Dhanpat Rai Publishing Co Pvt Ltd, 2. Ravi Shankar Industrial Engineering and Management Galgotia Publications Pvt Ltd, 3. Martand Telsang Industrial Engineering and Management Schand Publications |
| **Articles** | |
| **References Books** | 1 Jay Heizer and Barry Render Operations Management Pearson Education, 2000 2 Mikell P. Groover and Michael M. Grieve Work Systems: The Methods, Measurement & Management of Work Pearson Education, 2013 |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_me04/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3 |
| CO2 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | - | 2 | 3 | 3 |
| CO3 | 1 | 3 | 2 | 3 | - | - | - | - | - | 3 | - | - | 2 | 3 | 3 |
| CO4 | - | 3 | - | 3 | 2 | - | 2 | - | 3 | 3 | 3 | 1 | 3 | 3 | 3 |
| CO5 | 1 | 3 | 2 | 3 | - | - | - | - | - | 3 | 3 | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Kinematics of Machines |
| **Course Code** | MEL0415[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic velocity and acceleration. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various types of mechanism, velocity, acceleration, terminology of gears.**(BL1-Remember)**<br>**CO2-** To understand velocity and acceleration analysis of different types of mechanism.**(BL2-Understand)**<br>**CO3-** To implement velocity and acceleration analysis to cam, gears and different types of mechanism.**(BL3-Apply)**<br>**CO4-** To analyze the different types of mechanism.**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of kinematics of machine in various fields such as research and industries;**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Basic Concept of Mechanisms: Introduction to planar, spherical and special mechanisms, Terminology, mechanism and machine, link, kinematic pair, kinematic chain, mobility, classification of mechanisms, kinematic inversions, Grubler's criteria, Grashof's law. Introduction to other mechanisms: Universal joint, Pantograph, Straight line mechanisms, Davis and Ackermann's steering mechanisms. | Lectures with whiteboard/PPT, and animation of different mechanism, Recorded video/interactive videos | 8 |
| Unit-2 | Velocity Analysis: Velocity definition, rigid body rotation, velocity difference between points of rigid body, velocity polygon for simple mechanisms, vector method applied to complex mechanisms, Instantaneous center of velocity and its location, Aronhold Kennedy theorem of three centers, velocity analysis using instantaneous centers. | Lectures with whiteboard/PPT, and animation of different mechanism, Recorded video/interactive videos | 8 |
| Unit-3 | Acceleration analysis: Definition, types of acceleration, acceleration difference between points on a rigid body, acceleration polygon, analytical/vector methods, Corriolis acceleration and its examples | Lectures with whiteboard/PPT, and animation of different mechanism, Recorded video/interactive videos | 8 |
| Unit-4 | Cams: Introduction, classification of cams and followers, types of follower motion and their comparison, displacement diagram, nomenclature and graphical layout of cam profile, undercutting in cam profile, analytical treatment of tangent and circular cams with flat face and roller followers. | Lectures with whiteboard/PPT, and animation of different mechanism, Recorded video/interactive videos | 8 |
| Unit-5 | Gear and Gear Trains: Terminology and definitions, law of gearing, Involute properties, Gear tooth standards for interchangeable gears, Gear tooth action, path and arc of contact, contact ratio, interference and undercutting, avoiding interference. Gear Trains: Parallel axis gear trains, determination of number of teeth, velocity ratio, Epicyclic gear trains. | Lectures with whiteboard/PPT, and animation of different mechanism, Recorded video/interactive videos | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | 0 | | | |

Part E

| | |
|---|---|
| **Books** | 1. Rattan S S Theory of Machines TMH. |
| **Articles** | |
| **References Books** | 1 Ambekar A. G Mechanism and Machine Theory PHI 2 Ghosh A. and Mallick A. Theory of Mechanisms and Machines Affiliated East- KWest Press. 3 Shigley J.E. and Uicker J.J Theory of Machines and Mechanisms McGraw-Hill. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_me25/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | - | 3 | 2 | 3 | 2 |
| CO4 | 1 | 3 | 2 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 2 | 2 | 2 |
| CO5 | - | 1 | 1 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 1 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Machining processes |
| **Course Code** | MEL0442[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of material science and manufacturing processes | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To get the fundamentals of various machining operations.**(BL1-Remember)**<br>**CO2-** To understand the basic concept of metal cutting mechanism.**(BL2-Understand)**<br>**CO3-** To implement the mechanism of machining in different machines.**(BL3-Apply)**<br>**CO4-** To analyze the different parameters used in machining operations.**(BL4-Analyze)**<br>**CO5-** To evaluate different forces which act during the machining.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Metal Cutting: Economics of machines, introduction to machining processes, classification, mechanics of chip formation process, concept of shear angle, chip contraction and cutting forces in metal cutting, Merchant theory, tool wear, tool life, machinability. Fundamentals of measurement of cutting forces and chip tool interface temperature. | Lectures with whiteboard/PPT, Quiz, Group discussion | 11 |
| Unit 2 | Cutting Tools: Types, geometry of single point cutting tool, twist drill and milling cutter, tool signature. Cutting Tool Materials: Classification of cutting tool materials and properties, tool insert, Selection of machining parameters. Coolants and lubricants: classification, purpose, function and properties. | Lectures with whiteboard/PPT, Quiz, Group discussion | 10 |
| Unit 3 | Machine Tools Lathe: Classification, description and operations, kinematic scheme of lathe, and lathe attachments. Speed, feed and machine time calculations. Shaping And Planning Machine: Classification, description and operations. Milling Machine: Classification, description and operations, indexing devices, up milling and down milling. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit 4 | Drilling Machine: Classification, description and operations. Speed, feed and machine time calculations. Boring Machine: Classification, description and operations. Broaching Machine: Classification, description and operations. | Lectures with whiteboard/PPT, Quiz, Group discussion | 7 |
| Unit 5 | Grinding Machines: Classification, description and operations, grinding wheel composition, nomenclature of grinding wheels. Jigs and Fixtures: Locating and clamping devices, principles of jigs and fixtures, classification and application. | Lectures with whiteboard/PPT, Quiz, Group discussion | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment 1 | Study of different parts of lathe machine | Experiments | BL2-Understand | 2 |
| Experiment 2 | To perform Facing, Turning and Taper turning operations on the given work piece. | Experiments | BL5-Evaluate | 2 |
| Experiment 3 | To perform thread cutting and knurling operation on the given work piece. | Experiments | BL5-Evaluate | 2 |
| Experiment 4 | Study of different parts of Shaper machine | Experiments | BL2-Understand | 2 |
| Experiment 5 | To perform the operations on Shaper machine. | Experiments | BL5-Evaluate | 2 |
| Experiment 6 | Study of different parts of Milling machine | Experiments | BL2-Understand | 2 |
| Experiment 7 | To perform the operations on Milling machine. | Experiments | BL5-Evaluate | 2 |
| Experiment 8 | To perform the operations on Drilling machine. | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Ghosh and Mallick Manufacturing Science East West Press, 2010<br>Dr. P. C. Sharma Manufacturing Technology-II S. Chand & Company Ltd. |
| **Articles** | |
| **References Books** | P. C. Pandey Production Engineering Science Standard Publishers, 2010<br>P. N. Rao Manufacturing Technology Vol. II Tata McGraw–Hill, New Delhi, 2009<br>P M Groover Fundamental of modern manufacturing, Processes And System John Wiley and Sons, 2010 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/104/112104290/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | - | - | 3 | 3 | 3 |
| CO2 | 3 | - | 2 | 2 | - | 2 | 2 | - | 1 | 3 | - | - | 3 | 3 | 3 |
| CO3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 3 | 2 | 3 | 2 | 1 | - | 1 | - | - | - | - | - | 2 | - | 3 |
| CO5 | 3 | 1 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | 2 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Machine Design-I |
| **Course Code** | MEL0515[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Prerequisites for the course "Machine Design" include a strong foundation in mechanical engineering fundamentals, understanding of materials science, proficiency in engineering mathematics, engineering mechanics and solid mechanics , and familiarity with manufacturing processes and mechanical systems analysis. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic principle of Solid mechanics, Machine drawing, Engineering Mechanics, and stress- strain etc.**(BL1-Remember)**<br>**CO2-** To understand the concept of design against static loading for mechanical components and suitable material for machine components.**(BL2-Understand)**<br>**CO3-** To apply the concept of design against static loading for mechanical components**(BL3-Apply)**<br>**CO4-** To analyze the safe dimensions of Welded Joints, Riveted Joints, Shat, Key, Coupling, Spring and Screw Jack under the static and dynamic load.**(BL4-Analyze)**<br>**CO5-** To evaluate the applications of Machine design in various fields such as research and industries**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth)<br>SDG9(Industry Innovation and Infrastructure)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit -1 | Design process, Requirement for mechanical and other properties, Design procedure, and use of standards in design, preferred sizes, ergonomic and aesthetic considerations, Selection of materials, mechanical properties, designation for plain carbon steels, alloy steels, cast iron and their engineering usage. Design against static loads, modes of failure | Lecture with PPT, Audio/Video clips, group discussion, Physical model of gear, quiz | 10 |
| Unit -2 | Stress concentration and its effect on ductile and brittle materials, stress concentration factor for various geometries, cyclic stresses, notch sensitivity, design for finite and infinite life, Soderberg, Goodman & Gerber criteria | Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, Review Analysis | 6 |
| Unit -3 | Riveting methods, comparison of riveted joints with other joining methods, rivet materials, types of rivet heads, types of riveted joints, caulking and fullering, failure of riveted joints, efficiency of riveted joints, design of boiler joints, eccentric loaded riveted joint. Welded joints: Design of welded joints, butt welds, fillet welds-transverse and parallel fillet, eccentric load, fluctuating load on welded joints | Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, classroom presentations | 8 |
| Unit -4 | Shafts: Cause of failure in shaft, materials for shaft, stress in shaft, and design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments, shaft subjected to fatigue loads, design for rigidity. Keys: Types and selection, design of square and flat keys, splines. Couplings: Selection of couplings, design of rigid and flexible couplings. | Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |
| Unit -5 | Mechanical Spring: Types, nomenclature of helical and leaf springs, spring materials, types of ends, design of helical springs subjected to static and fatigue loading, design of leaf springs. Power Screws: Forms of threads, multiple threads, efficiency of square threads, trapezoidal threads, stresses in screws, design of simple screw jack | Lecture with PPT, Audio/Video clips, group discussion, lecture with PPT, quiz | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Material selectionand relevant BIS nomenclature | Experiments | BL2-Understand | 2 |
| Experiment -2 | development of series for new product | Experiments | BL2-Understand | 2 |
| Experiment -3 | Examples of Production considerations | Experiments | BL2-Understand | 2 |
| Experiment -4 | design of Knuckle & Cotter joints | Experiments | BL3-Apply | 2 |
| Experiment -5 | Design of machine Componets subjected to nFatigue Load | Experiments | BL3-Apply | 2 |
| Experiment -6 | Design of Riveted joints | PBL | BL4-Analyze | 2 |
| Experiment -7 | Design of welded joint | PBL | BL3-Apply | 2 |
| Experiment -8 | Design of Keyed joints and shaft couplings | PBL | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 12 | 60 | |

Part E

| | |
|---|---|
| **Books** | Bhandari, V. B. (2016). Design of Machine Elements. Tata McGraw-Hill Education.<br>Shigley, J. E., Mischke, C. R., & Budynas, R. G. (2010). Mechanical Engineering Design (9th ed.). McGraw-Hill Education. |
| **Articles** | |
| **References Books** | Spotts, M. F., Shoup, T. E., & Hornberger, E. T. (2010). Design of Machine Elements (8th ed.). Pearson.<br>Juvinall, R. C., & Marshek, K. M. (2011). Fundamentals of Machine Component Design (5th ed.). John Wiley & Sons.<br>Norton, R. L. (2009). Design of Machinery (4th ed.). McGraw-Hill Education. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/105/112105124/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | IC Engines |
| **Course Code** | MEL0516[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic thermal science. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember basic principles of thermal sciences.**(BL1-Remember)**<br>**CO2-** To understand the basic concept of thermodynamics, heat engines and air standard cycles.**(BL2-Understand)**<br>**CO3-** To implement the knowledge of thermodynamics in determining the engine parameters.**(BL3-Apply)**<br>**CO4-** To analyze the thermal efficiency of various cycles and cooling and lubrication systems.**(BL4-Analyze)**<br>**CO5-** To evaluate the findings of analysis of supercharging, cooling and lubrication systems within permissible limits of pollutants.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-I | Introduction to IC Engines: Definition of engine; classification, Application of IC Engines, Air Standard Cycle and deviation from air standard cycle actual cycle, indicator diagram, MEP, Shaft Power, Indicated Power. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-II | Actual working of IC engine: Introduction to fuel air cycles and their significance, composition of cylinder gases, variable specific heats, comparison of air standards & fuel air cycles, effect of operating variable like compression ratio, fuel air ratio, actual cycles and their analysis; difference between actual and fuel-air cycle; actual and fuel-air cycles for S.I. and C.I. engines. Working of 4 stroke petrol & diesel engines and their valve timing diagram, working of 2-stroke petrol & diesel engines & their valve timing diagrams, comparison of two stroke & four stroke engines, actual working of 2 & 4 stroke gas engines and their valve diagram | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-III | Fuel and Combustion: Fuels for SI and CI engine, Important qualities of SI and CI engines fuels, rating of SI engines, and CI engines fuels, Dopes, Combustion in CI engines, ignition delay, knock and its control, combustion chamber design for CI engines. Combustion in SI engine, detonation, additives, Gaseous fuels, LPG, CNG, Biogas, producer gas, alternatives fuels for IC engines. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-IV | Fuel Supply System: Fuel supply system and fuel pumps, properties of air fuel mixture, a sample carburetor an its working, actual air fuel ratio of single jet carburetor, supercharger, introduction to petrol injection, fuel injection systems for C.I., cooling and lubricants of IC engines. Classification of injection systems, injection pump, fuel injection systems, Fuel Injector, Nozzle, Injection of S.I. Engines, Fuel Filters. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-V | Measurement and Testing: Measurement of shaft power, indicated power, measurement of speed, air consumption, fuel consumption, heat carried by cooling water, heat carried by the exhaust gases, Morse test heat balance sheet, governing of I.C. Engines, performance characteristics of I.C. Engines: Performance parameters, performance of S.I. Engines, performance of C.I. Engine. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Study of working of Two stroke Petrol engine | Experiments | BL2-Understand | 2 |
| 2 | Study of working of Two stroke Diesel engine | Experiments | BL2-Understand | 2 |
| 3 | Study of working of four- stroke Diesel engine | Experiments | BL2-Understand | 2 |
| 4 | Study of working of four- stroke Petrol engine | Experiments | BL2-Understand | 2 |
| 5 | To determine the efficiency and heat balance of petrol engine | Experiments | BL3-Apply | 2 |
| 6 | To determine the efficiency and heat balance of Dieselengine | Experiments | BL3-Apply | 2 |
| 7 | Study of brake dynamometer | Experiments | BL2-Understand | 2 |
| 8 | To determine brake power of Petrol engine | Experiments | BL3-Apply | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. Sharma and Mathur, Internal Combustion Engines, Dhanpat Rai Publ. |
| **Articles** | |
| **References Books** | 1 Heywood John, Fundamentals of IC Engines, McGraw Hill. 2 Ganeshan V. , Internal Combustion Engines Tata McGRaw Hill 3 Domkundwar, Internal Combustion Engines, Dhanpath Rai & Sons |
| **MOOC Courses** | https://ocw.mit.edu/courses/2-61-internal-combustion-engines-spring-2017/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 1 | - | - | 3 | 3 | 1 | - | 1 | 3 | 3 | 1 | 1 | 1 |
| CO2 | 3 | 3 | 3 | 1 | - | 3 | 3 | 1 | - | 1 | 3 | 3 | 1 | 1 | 1 |
| CO3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 1 | - | - | 3 | 3 | 2 | 2 | 2 |
| CO4 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Dynamics of Machines |
| **Course Code** | MEL0518[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of engineering Mechanics, Kinematics of machines and basic sciences. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember basic principles of engineering mechanics and kinematics of machines.**(BL1-Remember)**<br>**CO2-** To understand the basic concept of system of forces and engine operations.**(BL2-Understand)**<br>**CO3-** To implement the basics in analyzing the forces on I C engines and steam engines, governors and flywheels.**(BL3-Apply)**<br>**CO4-** To analyze the force analysis in balancing of masses in reciprocating and rotary engines.**(BL4-Analyze)**<br>**CO5-** To evaluate the findings in implementation of balancing of masses and gyroscopes and vibrations.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Inertia Forces in Reciprocating Parts D'Alemberts principle, inertia force and inertia torque, equivalent dynamical system, analytical method for velocity and acceleration of the piston, angular velocity and acceleration of the connecting rod, forces on the reciprocating parts of the engine neglecting the weight of the connecting rod: piston effort, force acting along the connecting rod, thrust on the sides of the cylinder walls, crank pin effort and thrust on crank shaft bearing, torque on the crank shaft. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-2 | Turning Moment Diagrams and Flywheel Turning moment diagram for single cylinder double acting steam engine, fluctuation of energy, maximum fluctuation of energy, coefficient of fluctuation of energy. Flywheel: coefficient of fluctuation of speed, energy stored in a flywheel, dimensions of the flywheel. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-3 | Governors and gyroscope Introduction, Types of governors, terms used in governors, analysis of watt governor, porter governor , proell governor, sensitiveness of governors, stability of governors, hunting. Gyroscope: Introduction, processional angular motion, gyroscopic couple, effect of gyroscopic couple on an aero plane and naval ship. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-4 | Balancing Introduction, balancing of rotating masses: balancing of a single rotating mass by a single mass rotating in the same plane, balancing of a single rotating mass by two masses rotating in the different planes, balancing of several masses rotating in the same plane. Balancing of reciprocating masses: primary and secondary unbalanced forces of reciprocating masses, swaying couple and hammer blow. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| Unit-5 | Free vibrations Introduction: Types of free vibrations, natural frequency of free longitudinal ,free transverse vibrations and torsional vibrations , effect of inertia of the constraint in longitudinal , transverse and torsional free vibrations, natural frequency of free transverse vibration due to a point load acting over a simply supported shaft, natural frequency of free transverse vibrations for a shaft subjected to a number of point loads, critical speed of the shaft, free torsional vibration of a single rotor system, torsionally equivalent shaft. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | Experiment on Performance Characteristic Curves of Watt Governor | Experiments | BL2-Understand | 4 |
| Experiment-2 | Experiment on Performance Characteristic Curves of Porter Governor | Experiments | BL2-Understand | 4 |
| Experiment-3 | Estimation of Gyroscopic Couple & Understanding of Gyroscopic Effects on a rotating disc. | Experiments | BL3-Apply | 4 |
| Experiment-4 | Static And Dynamic Balancing of Rotating Masses | Experiments | BL4-Analyze | 4 |
| Experiment-5 | Undamped Torsional Vibrations of Single Rotor System | Experiments | BL4-Analyze | 4 |
| Experiment-6 | Free and Forced Vibration of Simply Supported Cantilever Beam. | Experiments | BL4-Analyze | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. Rattan S S Theory of Machines TMH. |
| **Articles** | |
| **References Books** | 1. Ambekar A. G Mechanism and Machine Theory PHI 2. Ghosh A. and Mallick A. Theory of Mechanisms and Machines Affiliated East- KWest Press. 3. Shigley J.E. and Uicker J.J Theory of Machines and Mechanisms McGraw-Hill |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/104/112104114/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Fluid Machinery |
| **Course Code** | MEL0521[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | integral calculus and differential equations, so these courses are prerequisites. It also helps to have taken physics and thermodynamics prior to this course | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall concept of basic sciences and fluid mechanics**(BL1-Remember)**<br>**CO2-** To Understand Components and operation; velocity triangles, work output**(BL2-Understand)**<br>**CO3-** To apply fluid mechanics in Components and operation, velocity triangles and work output**(BL3-Apply)**<br>**CO4-** To analyze Main elements and their functions; Various types and classification**(BL4-Analyze)**<br>**CO5-** To evaluate new Components, working principle; pressure variations due to piston acceleration**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Euler's turbomachinery equation, Specific speed, impulse and reaction principle, impulseMomentum principle, jet impingementon stationary and moving flat plates and vanes, calculation for force exerted, work done and efficiency of jet, basic components of turbo machinery and its classification. | Lectures with white board and PPT, Assignment | 10 |
| 2 | Components and operations, velocity triangles, work output, effective head, available power and efficiency, design aspects such as mean diameter of a wheel, Jet ratio, number of jets, number of buckets with working proportion | Lectures with white board and PPT,Quiz, Seminar | 10 |
| 3 | Component and operations, velocity triangle and work output, working proportions and design parameters for Runner, degree of reaction, draft tubes, its function and types, function and brief description of commonly used surge tanks. | Lectures with white board and PPT,Assignment, Poster presentation | 8 |
| 4 | Main elements and their function, periods types and classification, pressure change in a pump, suction, delivery and manometric head, vane shape and its effect on head capacity relationships, Departure from Euler's theory and losses, pump output and efficiency, minimum starting speed and impeller diameters at the inner and Outer periphery | Lectures with white board and PPT,Assignment, quiz | 8 |
| 5 | Components, working principles, pressure variation due to piston acceleration, acceleration effect in suction and delivery pipe, work done against friction, maximum permissible vacuum during suction stroke, Air vessel. | Lectures with white board and PPT,Quiz, seminar, Assignment | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | To verify momentum equation by impact of jet apparatus | Experiments | BL3-Apply | 04 |
| 2 | Study of Pelton turbine and perform experiment on Pelton turbine test rig | Experiments | BL4-Analyze | 04 |
| 3 | Study of Francis turbine | Experiments | | 04 |
| 4 | Study of Kaplan turbine and perform experiment on Kaplan turbine test rig | PBL | BL6-Create | 04 |
| 5 | Study of centrifugal pump and perform the experiment on centrifugal pump test rig | Experiments | BL2-Understand | 04 |
| 6 | Study of Reciprocating pump and perform the experiment on reciprocation pump test rig | Experiments | BL5-Evaluate | 04 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Hydraulic Turbines, Daughaty R L, McGraw Hill Book Co.. A Text book of Fluid Mechanics and Hydraulic Machines, Rajput, R.K., S. Chand and Co., New Delhi |
| **Articles** | |
| **References Books** | Fluid Mechanics and Fluid Power Engineering by Kumar D S, S K Kataria and Sons, Delhi Hydraulic Machines by Jagdish Lal, Metropolitan Book Co Pvt. Ltd Fluid Mechanics and Hydraulic Machines, Bansal, R.K., Laxmi Publications, New Delhi |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/105/112105206/ |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | - | 1 | 3 | 2 | 1 | 2 | 2 | 2 | - | 2 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 2 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 1 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Advanced Manufacturing |
| **Course Code** | MEL0522[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Information about basic manufacturing processs. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of manufacturing, material science, Production, Engineering Mechanics.**(BL1-Remember)**<br>**CO2-** To understating the concept of advanced machining process i.e. USM, AJM, WJM, AWJM, ECM, EDM, EBM, and LBM.**(BL2-Understand)**<br>**CO3-** To apply the concept of Advanced casting process i.e. Metal mould casting.**(BL3-Apply)**<br>**CO4-** To analysis of Advanced welding process i.e. EBW, LBM, USW, Plasma arc welding.**(BL4-Analyze)**<br>**CO5-** To evaluation of Advanced Metal Forming & Finishing Processes.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Advanced Machining Processes Limitations of conventional manufacturing processes, Need and classification of unconventional or advanced manufacturing processes, Process Principle, Parametric analysis and applications of processes such as ultrasonic machining (USM), Abrasive jet matching (AJM), Water jet machining(WJM), Abrasive water jet machining (AWJM), Electrochemical machining (ECM), Electro discharge machining (EDM), Electron beam machining (EBM), Laser beam machining (LBM) Processes. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-2 | Advanced Casting Processes Metal mould casting, Continuous Casting, Squeeze casting, Vacuum mould casting, Evaporative pattern casting, Ceramic shell casting , High pressure die casting process and study of injection chamber (HPDC). | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-3 | Advanced Welding Processes Details of electron beam welding (EBW), laser beam welding (LBW), ultrasonic welding (USW), Plasma Arc Welding. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-4 | Advanced Metal Forming Processes Details of high energy rate forming (HERF) process, electro- magnetic forming, explosive forming, Electro-hydraulic forming, Stretch forming, Contour roll forming, | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Advanced Finishing Processes Need, classification, process principle and applications of Abrasive Flow Finishing, Magnetic Abrasive Flow Finishing (MAFF) , Magnetic Abrasive Finishing (MAF) . | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | 0 | | 0 |

Part E

| | |
|---|---|
| **Books** | Benedict G.F. Non-Traditional Manufacturing Processes Marcel Dekker |
| **Articles** | |
| **References Books** | Jain V. K. Advance Machining Processes, Allied Publisher. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/107/112107078/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | 1 | - | - | - | - | - | - | - | - | 2 | - | 3 |
| CO2 | 3 | 3 | - | 3 | - | - | - | - | - | 3 | 2 | - | 3 | 3 | 3 |
| CO3 | 2 | 2 | - | 3 | - | - | - | - | - | 3 | 2 | - | 3 | 3 | 3 |
| CO4 | 3 | 3 | - | 3 | - | - | - | - | - | 3 | 2 | - | 3 | 3 | 3 |
| CO5 | 3 | 3 | - | 3 | - | - | - | - | - | 3 | 3 | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Industrial Automation and Control |
| **Course Code** | MEL0523[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Student should have knowledge of kinematics of machine and basic mathematics. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Recall the concepts of Kinematics of machines, Dynamics of machines.**(BL1-Remember)**<br>**CO2-** Understating the concept of joints and links.**(BL2-Understand)**<br>**CO3-** Applying the basic degree of freedom concept.**(BL3-Apply)**<br>**CO4-** Determine the options of fixed or flexible automation.**(BL4-Analyze)**<br>**CO5-** Determine the safe conditions of optimizing human and robots role.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Definition of an industrial automation, the advantages & disadvantages, Types of Automation, Automation in production system, Industrial Automation and Robotic Basic Concept Link and Joint Degree of freedom, Orientation Axes, Position Axes, Tool Centre Point (TCP), Work envelope/workspace. Speed, Payload, Repeatability, Accuracy, Settling Lectures with whiteboard/PPT, Quiz, Group discussion Time, Control Resolution, Coordinates, Accuracy and Repeatability, Control resolution, Payload Components, Applications, of Automation system. | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-2 | Mechanical System: Components, Dynamics and Modeling Elementary Mechanical Concepts Translation or Linear Motion Rotational Motion- Mechanical Work and power, Motion Conversion Rotary to Rotary Motion Conversion, Rotary to Linear Motion Conversion, Linkages, Couplers, The Concept of Power Transfer, Modelling of Mechanical System-Elements, Rules and Nomenclature, Translational Example, Rotational Example, Electrical Analog | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-3 | Actuators--Flow Control Valves, Electric actuators, Relays, Power relays, - General purpose relay, -Hydraulic Actuators, -Pneumatic Actuators, Pneumatic Valves Stepper Motors-Principles of stepper motor operation, Half Step Mode Operation, Micro-step Mode, Methods of Damping Rotor Oscillations, Permanent Magnet Stepper Motors Stepper motor drives, Linear stepper, motors | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-4 | Classification of sensors, Sensor generalities, Sensor characteristics, Angular and Linear Position Sensors, Velocity and Acceleration Sensors Tacho generator, Signac interferometer, micromechanical angular velocity and acceleration sensor, Contact sensor Piezoresistive and capacitive tactile sensors, optical tactile sensors, force measurement by deformation of contact sensors, principle and applications of strain gage sensors, Laser-Range Radar, Laser interferometric distance meter, Laser-Doppler Velocimeter, Pressure, Temperature, Flow measurement | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |
| Unit-5 | Automation Design and process specifications, Mechanical Description of the automation, Motion Sequence, Motor and Drive Mechanism Selection, Encoder Selection, Control Structure: Programmable Logic Controller used for Industrial Automation. Lectures with whiteboard/PPT, Quiz, Group discussion | Lectures with whiteboard/PPT, Quiz, Group discussion | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | 1. Dr. K. Shivanand and Dr. M. N. Shanmukha Swamy Industrial Automation and Engineering Approach CRC Press |
| **Articles** | |
| **References Books** | 1 Stamatios Manesis George Nikolakopoulos Introduction to Industrial Automation CRC Press Taylor & Francis Group |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc20_me39/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO2 | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO3 | 1 | 3 | 2 | 3 | - | - | - | - | - | 3 | - | - | 2 | 3 | 3 |
| CO4 | 1 | 3 | 2 | 3 | 1 | - | 3 | - | - | 3 | 3 | - | 3 | 3 | 3 |
| CO5 | - | 3 | 2 | 3 | - | - | - | - | - | 3 | 3 | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Machine Design-II |
| **Course Code** | MEL0617[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Prerequisites for the course "Machine Design" include a strong foundation in mechanical engineering fundamentals, understanding of materials science, proficiency in engineering mathematics, knowledge of engineering mechanics, Solid Mechanics, Machine Desig-I and familiarity with manufacturing processes and mechanical systems analysis. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment -1 | Design of Spur gear | Experiments | BL3-Apply | 2 |
| Experiment -2 | Design of Helical Gear | Experiments | BL3-Apply | 2 |
| Experiment -3 | Design of Sliding contact bearing design | Experiments | BL3-Apply | 2 |
| Experiment -4 | Design of Anti-friction bearing selection | Experiments | BL2-Understand | 2 |
| Experiment -5 | Design of IC engine Components | Experiments | BL3-Apply | 2 |
| Experiment -6 | Design of Clutches | Experiments | BL2-Understand | 2 |
| Experiment -7 | Design of Brakes | Experiments | BL3-Apply | 2 |
| Experiment -8 | Design of IC engine Components | Experiments | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Bhandari, V. B. (2016). Design of Machine Elements. Tata McGraw-Hill Education.<br>Shigley, J. E., Mischke, C. R., & Budynas, R. G. (2010). Mechanical Engineering Design (9th ed.). McGraw-Hill Education. |
| **Articles** | |
| **References Books** | Spotts, M. F., Shoup, T. E., & Hornberger, E. T. (2010). Design of Machine Elements (8th ed.). Pearson.<br>Juvinall, R. C., & Marshek, K. M. (2011). Fundamentals of Machine Component Design (5th ed.). John Wiley & Sons.<br>Norton, R. L. (2009). Design of Machinery (4th ed.). McGraw-Hill Education. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/106/112106137/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Heat and Mass Transfer |
| **Course Code** | MEL0619[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Heat Transfer uses calculus and differential equations, which are prerequisites, and taking a basic fluids course. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Heat transfer through composite wall | Experiments | BL2-Understand | 03 |
| 2 | Thermal conductivity of insulation slab | Experiments | BL3-Apply | 03 |
| 3 | Heat transfer through a pin fin | Experiments | BL4-Analyze | 03 |
| 4 | Heat transfer by natural convection | Experiments | BL4-Analyze | 03 |
| 5 | Heat transfer by forced convection | Experiments | BL5-Evaluate | 03 |
| 6 | To perform experiment on Stefan Boltzman apparatus | Experiments | BL5-Evaluate | 03 |
| 7 | Drop Wise film condensation | Experiments | BL6-Create | 03 |
| 8 | LMTD of heat exchanger | Experiments | BL4-Analyze | 03 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | | 60 | |

Part E

| | |
|---|---|
| **Books** | Sachdeva R. C., “Fundamentals of Engineering Heat and Mass Transfer” New Age International, 1995. D. S. Kumar, Heat and Mass Transfer, SK Kataria & Sons, 2009 |
| **Articles** | |
| **References Books** | Nag P. K, “Heat Transfer”, Tata McGraw-Hill, New Delhi, 2002 Holman J. P. “Heat and Mass Transfer” Tata McGraw-Hill, 2000. Kothandaraman C. P. “Fundamentals of Heat and Mass Transfer” New Age International, New Delhi Frank P. Incropera and David P. DeWitt, “Fundamentals of Heat and Mass Transfer”, John Wiley Cengel, Yunus A., Heat Transfer- A practical approach, McGraw-Hill Rathore M. M., Comprehensive engineering heat transfer, New Delhi |
| **MOOC Courses** | https://www.mooc-list.com/tags/heat-transfer |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Operations Research |
| **Course Code** | MEL0626[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of linear equation, Engineering mathematics and industrial engineering. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | 1. Gupta & Hira, Operations Research S. Chand & Company |
| **Articles** | |
| **References Books** | [1] Gupta & Hira, Operations Research, S. Chand & Company [2] Taha Operations Research, Pearson Education [3] Kedar Nath and Ram Nath, Operations Research, Publishers [4] Philips Ravindran, Operations Research, Solberg Wiley India Pvt. Limited. |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_ma48/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | - | - | - | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 1 | 2 | 2 | 2 | 1 | - | - | - | - | 1 | - | 3 | 2 | 3 | 2 |
| CO4 | 1 | 3 | 2 | 3 | 2 | - | 3 | 2 | - | - | 2 | 2 | 2 | 2 | 2 |
| CO5 | - | 1 | 1 | 2 | 2 | - | - | - | - | - | 2 | - | 1 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Computer Aided Design |
| **Course Code** | MEL0722[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Prerequisites for the course "Computer Aided Design" typically include a foundational knowledge of computer science concepts, proficiency in programming languages such as C++ or Python, ,familiarity with algorithms and data structures, and basic understanding of graphical user interfaces and design principles. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | To create a 2D view of the given diagram using Auto CAD. | Experiments | BL2-Understand | 2 |
| Experiment-2 | To create a 2D view of the given diagram using Auto CAD. | Experiments | BL2-Understand | 2 |
| Experiment-3 | To create a 2D isometric view of the given diagram using Auto CAD. | Experiments | BL3-Apply | 2 |
| Experiment-4 | draw the sketch of the model shown in Figure using SolidWorks | Experiments | BL2-Understand | 2 |
| Experiment-5 | To draw the basic sketch for the revolved solid model shown in Figure using SolidWorks | Experiments | BL3-Apply | 2 |
| Experiment-6 | INTRODUCTION TO CATIA V5R19 | Experiments | BL2-Understand | 2 |
| Experiment-7 | To draw the sketch of the model shown in Figure using CATIA | Experiments | BL3-Apply | 2 |
| Experiment-8 | INTRODUCTION TO FEA and ANSYS | PBL | BL4-Analyze | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Kumar, S., Srivastava, S. K., & Srivastava Sr., S. K. (2012). Computer Aided Design: A Basic and Mathematical Approach I.K. International Publishing House Pvt. Limited<br>Zeid, I. (2016). Mastering CAD/CAM. McGraw-Hill Education. |
| **Articles** | |
| **References Books** | Kularatne, D., & Wijesundara, S. (2017). Computer-Aided Design and Manufacturing. CRC Press.<br>Groover, M. P., & Zimmers, E. W. (2014). CAD/CAM: Computer-Aided Design and Manufacturing. Prentice Hall. |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/102/112102101/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 3 | - | 1 | 2 | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | 2 | - | 2 | 1 | 2 | - | 2 | - | 2 | 1 | - | 1 | 3 | 3 | 2 |
| CO4 | 3 | 2 | 2 | 3 | 2 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 |
| CO5 | 2 | 2 | 1 | 2 | 2 | - | - | 3 | - | - | 3 | 2 | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Refrigeration and Air Conditioning |
| **Course Code** | MEL0723[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Knowledge of thermodynamics and fluid mechanics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Study of VCRC | Experiments | BL2-Understand | 03 |
| 2 | To estimate COP of mechanical heat pump and refrigerator | Experiments | BL3-Apply | 03 |
| 3 | To study VARC | Experiments | | 03 |
| 4 | To estimate COP of vapor compression ice plant | Experiments | BL4-Analyze | 03 |
| 5 | Estimate performance of window air conditioning system | Experiments | BL5-Evaluate | 03 |
| 6 | Study of 2 stage reciprocating air compressor | Experiments | BL6-Create | 03 |
| 7 | To study element of air conditioning system | Experiments | BL5-Evaluate | 03 |
| 8 | Study about various refrigerant | PBL | BL3-Apply | 03 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Refrigeration and Air Conditioning Technology Modern Refrigeration and Air Conditioning |
| **Articles** | |
| **References Books** | 1 Hooman Gohari Air Conditioning and Refrigeration Repair Made Easy McGraw-Hill Education |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc22_me135/preview |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 1 | 1 | 2 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO2 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 1 | - | 3 | 3 | 3 |
| CO3 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | - | 3 | 3 | 3 | 3 |
| CO4 | 1 | 3 | 3 | 3 | 2 | - | 3 | 2 | - | - | 3 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 2 | 2 | 2 | 3 | 3 | - | - | - | 2 | - | 3 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Total Quality Management |
| **Course Code** | MEL0727[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of Probability & Statistics | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✓<br>Environment ✕ | | **SDG (Goals)** | SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Joel E. Ross Total Quality Management: Text, Cases, and Readings Routledge |
| **Articles** | |
| **References Books** | R. Panneerselvam Total Quality Management: Key Concepts and Case Studies Prentice Hall India |
| **MOOC Courses** | https://onlinecourses.nptel.ac.in/noc20_mg34/preview |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | 2 | 3 | - | - | 2 | 1 | - | 2 | 2 | - | 3 | - | 3 |
| CO2 | 3 | 2 | 2 | 3 | - | 2 | 3 | 1 | 3 | 3 | 3 | - | 3 | 3 | 3 |
| CO3 | 3 | 3 | 2 | 3 | - | 2 | 3 | 1 | 3 | 3 | 3 | - | 3 | 3 | 3 |
| CO4 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 1 | 3 | 3 | 3 | 1 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 1 | 3 | 3 | 3 | 1 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Automobile Engineering |
| **Course Code** | MEL0825[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of engine parts. body of vehicle and thermodynamics. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✓ | | **SDG (Goals)** | SDG7(Affordable and clean energy)<br>SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | To Study of Automobile Chasis. | Experiments | BL2-Understand | 2 |
| Experiment-2 | To Study of differential mechanism of an Automobile | Experiments | BL2-Understand | 2 |
| Experiment-3 | To Study of multiple clutch of an Automobile. | Experiments | BL2-Understand | 2 |
| Experiment-4 | To Study and demonstration of different circuit of carburettor. | Experiments | BL2-Understand | 2 |
| Experiment-5 | To Study of the electrical system of Automobile. | Experiments | BL2-Understand | 2 |
| Experiment-6 | To Study of the Torque convertor. | Experiments | BL2-Understand | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. Automobile Engineering, Kripal Singh 2. Automotive Engineering, Hietner 3 Automotive Mechanics, Crouse |
| **Articles** | |
| **References Books** | 1. Automobile Engineering,Narang 2. Automobile Engineering, Newton and Steeds. 3 Jack Erjavec and Jeff Arias, “Hybrid, Electric and Fuel Cell Vehicles”, Cengage Learning, 2012 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/107/106/107106088/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 2 | 2 | - | - | 3 | 3 | - | - | 3 | - | 2 |
| CO2 | 2 | - | 1 | 2 | 1 | 2 | - | - | 3 | 3 | - | - | 3 | 2 | 2 |
| CO3 | 1 | - | 2 | 1 | 1 | - | - | - | 2 | 1 | - | - | 3 | 2 | 2 |
| CO4 | - | 1 | 2 | 3 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO5 | - | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | CNC and Flexible Manufacturing Systems |
| **Course Code** | MEL0827[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 2 | 1 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Conventional machining process and production system | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment 1 | To study the features of CNC machine tool. | Experiments | BL2-Understand | 2 |
| Experiment 2 | To perform facing and turning operations on the given work piece. | Experiments | BL5-Evaluate | 2 |
| Experiment 3 | To perform the multiple turning operation on the given work piece. | Experiments | BL5-Evaluate | 2 |
| Experiment 4 | To perform the drilling operation on the given work piece. | Experiments | BL5-Evaluate | 2 |
| Experiment 5 | To perform the boaring operation on the given work piece. | Experiments | BL5-Evaluate | 2 |
| Experiment 6 | To perform the grooving operation on the given work piece. | Experiments | BL5-Evaluate | 2 |
| Experiment 7 | To perform the threading operation on the given work piece. | Experiments | BL5-Evaluate | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 40 | 12 | 60 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | Machines P. Radahkrishnan Computer Numerical Control New Central Book Agency<br>H.K. Shivanand, M.M. Benal, V. Koti Flexible Manufacturing System New age international publishers |
| **Articles** | |
| **References Books** | M.S. Sehrawat and J.S. Narang CNC Machines Dhanpat Rai and Co.<br>Prof. S. K. Sinha CNC Programming using Fanuc Custom Macro McGraw Hill, 2001 |
| **MOOC Courses** | https://www.mooc-list.com/tags/automotive-engineering |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | 2 | 2 | 2 | 2 | 1 | 3 | 1 | - | - | 3 | 3 | 3 |
| CO2 | 2 | - | - | 2 | 1 | 2 | - | - | 1 | 1 | - | - | 3 | 2 | 3 |
| CO3 | 2 | 1 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO5 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Mechanical Workshop Practice |
| **Course Code** | MEP0101[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of casting, joining and machining. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | To study of Tools and Their Operations in Carpentry joint | Experiments | BL2-Understand | 4 |
| Experiment-2 | To Prepare Half Lap corner joint and T- joint | Experiments | BL3-Apply | 4 |
| Experiment-3 | To study of tools and their operations in Fitting Shop | Experiments | BL3-Apply | 4 |
| Experiment-4 | To study of tool and operations in welding shop | Experiments | BL3-Apply | 4 |
| Experiment-5 | To study of single point cutting tools , machine tool and operations in machine shop | Experiments | BL3-Apply | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | 0 | 0 | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. S. K. Hazra Chowdhry Elements of Workshop Technology Vol-1 Tata Mc Graw Hill Publication 2 John K.C Mechanical Workshop Practice Paperback – 1 Khanna Publishers, 2001 |
| **Articles** | |
| **References Books** | 1. English, Paperback, Dave A K, Dubey D Workshop Technology & Practice Standard Publishers, 2010 2. W.A.J. Chapman Workshop Technology by vol. 1,2 Mc Graw Hill, 2001 |
| **MOOC Courses** | https://archive.nptel.ac.in/courses/112/103/112103108/ |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | - | - | 2 | 2 | 1 | - | - | 2 | 2 | 2 | 1 | - | - |
| CO2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | - | - | - | 2 | 2 | 3 | 3 |
| CO3 | 2 | 1 | 2 | - | - | - | 2 | 2 | - | - | - | 2 | 3 | - | 3 |
| CO4 | 1 | 2 | 2 | - | - | 2 | 1 | - | - | 2 | 2 | 3 | 3 | 2 | 2 |
| CO5 | - | 2 | 1 | 2 | 2 | 2 | 3 | 2 | - | - | - | 2 | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BTech-MechanicalEngineering

| | |
|---|---|
| **Title of the Course** | Machine drawing |
| **Course Code** | MEP0302[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of engineering graphics and machine parts. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To recall the concepts of basic sciences and engineering mechanics**(BL1-Remember)**<br>**CO2-** To describe the application of engineering mechanics and physics in fluids.**(BL2-Understand)**<br>**CO3-** To apply the knowledge of fluids in laminar and turbulent flow of various systems.**(BL3-Apply)**<br>**CO4-** To analyze the systems in boundary layer.**(BL4-Analyze)**<br>**CO5-** To evaluate the systems through computational fluid dynamics.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG9(Industry Innovation and Infrastructure) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Experiment-1 | To discribe sectioning of materials | Experiments | BL2-Understand | 2 |
| Experiment-2 | conventional representation of machine parts | Experiments | BL2-Understand | 2 |
| Experiment-3 | drawing of various riveted joints, standard proportions, Cotter and Knuckle joints. | Experiments | BL3-Apply | 4 |
| Experiment-4 | Assembly drawing of power transmission components and I C Engine parts. | Experiments | BL3-Apply | 4 |
| Experiment-5 | To study of camputer added drafting | Experiments | BL4-Analyze | 4 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 40 | 20 | 60 | |

Part E

| | |
|---|---|
| **Books** | 1. N.D.Bhatt Machine Drawing Charotar Publication 2 P.S. Gill Engineering Drawing Kataria Publication 3 K C John Textbook of machine drawing EEE, PHI |
| **Articles** | |
| **References Books** | 1 K. L. Narayana Machine Drawing New Age International 2 N Sidheswar Machine Drawing Tata Mcgraw Hill |
| **MOOC Courses** | https://nptel.ac.in/courses/112103019 |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | - | - | 2 | 2 | 1 | - | - | 2 | 2 | 2 | 1 | - | - |
| CO2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | - | - | - | 2 | 2 | 3 | 3 | 3 |
| CO3 | 2 | 1 | 2 | - | - | - | 2 | 2 | - | - | - | 2 | 3 | - | 3 |
| CO4 | 1 | 2 | 2 | 3 | 2 | - | 2 | 1 | - | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | - | 2 | 1 | 2 | 2 | 3 | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Object Oriented Programming with C++ |
| **Course Code** | BCA -203(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | knowledge of basic C Concept,data type,functions | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Revised the basics of Programming concepts like structured, unstructured & Object Oriented programming concepts..**(BL1-Remember)**<br>**CO2-** Understand the difference between C & C++ programming structure, logic with and without Object Oriented Programming.**(BL2-Understand)**<br>**CO3-** Implement the OOP concepts as practical like Polymorphisms, Inheritance, and DMA.**(BL3-Apply)**<br>**CO4-** Apply OOP concepts and their syntax like Class objects, Constructor, Polymorphism, inheritance and DMA.**(BL3-Apply)**<br>**CO5-** Evaluating the performance and difference of various concepts and logics of OOP with respect to problem domain.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Concepts of object oriented programming, Need of Object Oriented Programming, Characteristics of OOP: Classes & Objects, Inheritance, Data Hiding, Encapsulation, Polymorphism, Overloading, Classes and Structures, Classes and Unions Overview of C++, Compiling & Debugging C++ Program, Basics: Preprocessor Directives, Header files, Input and Output Streams, Cout, Cin, Comments, Type Casting. Creating class, Data member and member function. Creating objects and accessing member functions through objects. | Lecturing | 10 |
| II | C++ streams, Formatted I/O: Formatting using the ios members, Setting and clearing the format flags, using manipulators to format I/O, Creating your own manipulators. Introduction to Constructor, Parameterized constructor, Multiple constructors, Default arguments constructor, Copy constructor, Destructor. Friend function, Friend classes, Inline function, Scope resolution operator, Static class members: Static data member, Static member function, passing objects to function, Returning objects, Object assignment. | Lecturing,Experiment | 9 |
| III | Function overloading, Function Signature. Overloading constructor function, finding the address of an overloaded function Operator Overloading: Overloading Unary Operators, Operator Keyword, Operator Arguments, Overloading Binary Operators: Arithmetic Operators, Concatenating Strings, Comparison Operators, Assignment Operators, Overloading Using friend function, Overloading Special Operators: New, Delete, <<. | Lecturing,Experiment | 8 |
| IV | Inheritance: Base & Derived class, Accessing Base Class ember, Specifying Derived Class, Protected Specifier, and Overriding Member Function. Virtual Functions, Pure Virtual Functions, Virtual Base Class, Late Binding, this pointer, Accessing Member data with this pointer. Abstract base class, Public and Private Inheritance, Levels of Inheritance. | Lecturing,Experiment | 10 |
| V | Containership: Classes within Classes Pointers: Address of Operator &, Pointer variable, Pointers and Arrays, Pointers and Functions, passing variables, Arrays, Pointer and Strings, Memory Management using new and delete, pointers to Objects: reference to members. Exception handling in CPP: types of exception handling. Command Line Arguments. | Lecturing,Experiment | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| II-V | Write separate functions to swap 2 integers making use of (i) pointer parameters and (ii) reference parameters (iii) constant data member 2 Create a class called Counter that contains a static data member to count the number of Counter objects being created. Also define a static member function called showCount() which displays the number of objects created at any given point of time. Which displays the number of objects created at any given point of time. 3 Define a class to represent a Bank account. Include the following members. a. Data members:- b. Name of the depositor c. Account number. d. Type of account. e. Balance amount in the account. f. Rate of interest (static data) 4 Provide a default constructor, a parameterized constructor and a copy constructor to this class. a. Also provide Member Functions:- 1.To deposit amount. 2.To withdraw amount after checking for minimum balance. 3.To display all the details of an account holder. 4.Display rate of interest (a static function) 5 Write an overloaded function called compute Area which is used to compute the area of a triangle, a rectangle and a circle, respectively. Show the invocation of these functions in the main. 6. Write a C++ class that contains two classes' car and track. The car class contains two private variables passengers and speed. The track class contains two private variables load and speed. Use friend function to compare the speed 7. A file contains a list of names and telephone numbers in the following form: Name Tel. No. Write a C++ program to read the file and output the list in the tabular format. The name should be left-justified and numbers right-justified. Use a class object to store each set of data. Program should also perform following tasks. i) To determine the telephone numbers of the specified person. ii) To determine the name if a telephone number is given. | Experiments | BL3-Apply | 10 |
| II-V | Create PBL on any given Topic 1. CGPA Calculator 2. Rock Paper Scissor 3. Casino Number Guessing Game 4. Calculator for Scientific Operations 5. Login and Registration System 6. Student Database Management System 7. Inventory System 8. Payroll System 9. Banking System 10. Medical Information System 11. Stock Management System 12. Hospital Management System 13. School Management System 14. Hotel Management System 15. Library Management System 16. Traffic Management System 17. Trading Application 18. Snake Game 19. Tic-Tac-Toe 20. Phonebook Application | PBL | BL3-Apply | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Stroustrup, B. (2013). The C++ Programming Language (4th ed.). Addison-Wesley. Balagurusamy, E. (2018). Object-Oriented Programming with C++ (6th ed.). McGraw-Hill Education. |
| **Articles** | |
| **References Books** | Lafore, R. (2002). Object-Oriented Programming in C++ (4th ed.). Pearson Education. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | 1 | 1 | 2 | 2 | 2 | - | - | - | - | - | - | 2 | 2 | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 1 | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Computer Assembling and Repair |
| **Course Code** | BCA -206 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of Information Technology, Computer System, various peripherals, I/o devices, and storage devices.**(BL1-Remember)**<br>**CO2-** To Understand the Basic concept of operating system, working of MS PowerPoint software and working of MS PowerPoint software .**(BL2-Understand)**<br>**CO3-** To Apply concept to identify type of software, Create formula using MS Excel Tool**(BL3-Apply)**<br>**CO4-** To Analyze Various softwares , Analyze the data by using statistical functions using MS- Excel tool and with absolute and relative cell references using MS-Excel tool**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the performance of various operating system, graphs and tables created in Microsoft Excel , equations and sample calculations .**(BL5-Evaluate)**<br>**CO6-** To Create various documents newsletters, brochures, making document using photographs, charts, presentation, documents, drawings and other graphic images.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Introduction to PC Hardware: Study of basic I/O systems, Types of Memories- Static RAM and Dynamic RAM, ROM, PROM, EPROM, | Lecturing | 9 |
| Unit 2 | Motherboard and Processor: Study of different types of Motherboards, Motherboard Configuration, Identifying Internal and External connectors, Types of data cables, Types of Processor- Intel Pentium IV, Dual core, Core 2 Duo, Quad processor etc,. Documents - Using Macros, Quick parts, and Content Links - Using Fields, Forms and Indexes. | Lecturing | 8 |
| Unit 3 | BIOS Configuration: Study of BIOS Set-up- Advance set-up, Boot configuration, Boot Menu. Installation of OS (Operating Software): Windows XP, installation of different types of Service Packs, Vista and Windows-7 etc. | Lecturing,Experiment | 9 |
| Unit 4 | Hard Disk: Formatting of Hard disk, Partitioning of Hard disk in different logical drives, Disk defragmentation, Disk clean up, Scan disk etc,. Installation of Device Drivers: Different types of Motherboard drivers, LAN, Audio, and Video. | Lecturing,Experiment | 8 |
| Unit 5 | Configuration of External devices: Physical set-up of Printers- Performing test print out, Printing of document etc, Scanner set-up, Webcam, Bluetooth device, Memory card reader etc. Diagnostic and troubleshooting of PC: POST (Power on Self Test), identifying problems by Beep codes errors, checking power supply using Multi-meter, Replacement of components etc. Configuration of External devices: Physical set-up of Printers- Performing test print out, Printing of document etc, Scanner set-up, Webcam, Bluetooth device, Memory card reader etc. Maintenance of PC. | Lecturing,Experiment | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| II-V | Write separate functions to swap 2 integers making use of (i) pointer parameters and (ii) reference parameters (iii) constant data member 2 Create a class called Counter that contains a static data member to count the number of Counter objects being created. Also define a static member function called showCount() which displays the number of objects created at any given point of time. Which displays the number of objects created at any given point of time. 3 Define a class to represent a Bank account. Include the following members. a. Data members:- b. Name of the depositor c. Account number. d. Type of account. e. Balance amount in the account. f. Rate of interest (static data) 4 Provide a default constructor, a parameterized constructor and a copy constructor to this class. a. Also provide Member Functions:- 1.To deposit amount. 2.To withdraw amount after checking for minimum balance. 3.To display all the details of an account holder. 4.Display rate of interest (a static function) 5 Write an overloaded function called compute Area which is used to compute the area of a triangle, a rectangle and a circle, respectively. Show the invocation of these functions in the main. 6. Write a C++ class that contains two classes' car and track. The car class contains two private variables passengers and speed. The track class contains two private variables load and speed. Use friend function to compare the speed 7. A file contains a list of names and telephone numbers in the following form: Name Tel. No. Write a C++ program to read the file and output the list in the tabular format. The name should be left-justified and numbers right-justified. Use a class object to store each set of data. Program should also perform following tasks. i) To determine the telephone numbers of the specified person. ii) To determine the name if a telephone number is given. | Experiments | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Alexander, M., & Kusleika, R. (2015). Access 2016 Bible. John Wiley & Sons. |
| **Articles** | Berk, K. N. (2006). Data Analysis with Microsoft Excel. |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | 1 | - | - | - | - | - | - | 1 | 2 | 3 | 2 |
| CO2 | 2 | 3 | - | - | 2 | - | - | - | - | 1 | - | 1 | 2 | 1 | 2 |
| CO3 | 2 | 2 | 3 | 1 | 3 | - | - | - | - | - | 1 | 2 | 2 | 2 | 1 |
| CO4 | 2 | 3 | 2 | 3 | 3 | - | - | - | - | 2 | - | 2 | 3 | 2 | 2 |
| CO5 | 2 | 3 | 2 | 3 | 3 | 2 | - | - | 1 | 2 | 2 | 2 | 3 | 2 | 2 |
| CO6 | 2 | 2 | 3 | 2 | 3 | - | - | - | - | 3 | 2 | 3 | 2 | 1 | 3 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Software Engineering |
| **Course Code** | BCA 402 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | student must have knowledge about basic data structures , computer organization & programming language concepts. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basics of software engineering **(BL1-Remember)**<br>**CO2-** To understand the basics characteristic's & crisis of software and process of software engineering systems**(BL2-Understand)**<br>**CO3-** To implement various SDLC, ER, DFD models, to collect SRS, And understand the software.**(BL3-Apply)**<br>**CO4-** To Analyze various various testing techniques and the concept of testing strategies**(BL4-Analyze)**<br>**CO5-** To evaluate the the need of Software Maintenance and Software Project Management Software **(BL5-Evaluate)**<br>**CO6-** To create the various Design Strategies, Architectural Design concept for better development of software.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction to Software Engineering: Software, The changing nature of software, product and process, software engineering-a layered technology. | Lecturing | 6 |
| Unit-2 | Process Models: Software Development Process Model, Waterfall Model, Prototyping Model, Spiral Model, Iterative Model | Case Study | 6 |
| Unit-3 | Software Project Management: The Management Spectrum, Scheduling and Tracking, SW Measurement - Size, Process and Project Metrics; LOC | Lecturing | 6 |
| Unit-4 | Software Design: Design Concepts-abstraction, architecture, modularity . Software Quality Assurance: Quality Concepts, Software Quality Assurance, Assurance, Software Reliability, Introduction to ISO standard. | Case Study | 6 |
| Unit-5 | Software Testing and maintenance: Definition, Types of Testing: Black Box Testing, White Box Testing, Unit Testing, Integration Testing, system testing , Introduction of maintenance. | Case Study | 6 |

**Case Study**
**Software Engineering (402)**

1. Analysing the challenges and solutions for software maintenance: Students are required to identify the challenges appeared during software maintenance using various types of information gathering tools and must propose a systematic and feasible maintenance plan with output showing growth with respect to following points
    - User Satisfaction level
    - Software periodic update
    - Software Licence renewable
    - Software upgradability.

2. Perform automated testing and design customized test cases on any project modules. Also report the bugs encountered during testing phase and compute time incurred in rectifying bugs during testing phase. Compare the time involved in rectifying bugs at development phase and at testing phase.
3. You are required to build a Inventory management system for a departmental store, Prepare a logical design as well as use case and system flowcharts for the same.

4. You are required to build a Student information system for a departmental of school of Engineering, Prepare a logical design as well as use case and system flowcharts for the same.
5. 
6. Compute the following using any project/modules of your choice
    - Product Metrics
    - Process Metrics
    - Project Metrics
7. Prepare a complete SRS report of a software that is not in existence as well as software that is already is being used but needs to be updated.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Pressman, R. S., & Dr, B. R. M. (2014, January 23). Software Engineering: A Practitioner's Approach. McGraw-Hill Education. http://books.google.ie/books? |
| **Articles** | |
| **References Books** | Pressman, R. S., & Dr, B. R. M. (2014, January 23). Software Engineering: A Practitioner's Approach. McGraw-Hill Education. http://books.google.ie/books? |
| **MOOC Courses** | |
| **Videos** | https://onlinecourses.nptel.ac.in/noc20_cs68/preview |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 2 |
| CO2 | 1 | - | - | - | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 3 |
| CO3 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO6 | 1 | 1 | 2 | 3 | 2 | 2 | - | - | - | 2 | - | - | 3 | 3 | 3 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | AI and its Applications |
| **Course Code** | BCA 502 A |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | General programming concepts, understanding of software systems, Software engineering process, Logic. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember**(BL1-Remember)**<br>**CO2-** Understand**(BL2-Understand)**<br>**CO3-** Analyze**(BL3-Apply)**<br>**CO4-** Apply**(BL4-Analyze)**<br>**CO5-** Create**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit -1 | General Issues and Overview of AI The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays | Lecturing | 12 |
| Unit 2 | Problem Solving, Search and Control Strategies: General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search. Heuristic Search Techniques Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems. | Lecturing | 10 |
| Unit 3 | Knowledge Representations : First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency. | Lecturing | 10 |
| Unit 4 | Natural Language processing Parsing techniques, context free grammar, recursive transitions nets (RNT), augmented transition nets (ATN), case and logic grammars, symantic analysis.Game playing Minimax search procedure, alpha-beta cutoffs, additional refinements. Planning: Overview an example domain the block word, component of planning systems, goal stack planning, non linear planning. | Case Study | 7 |
| Unit 5 | Probabilistic Reasoning and Uncertainty Probability theory, bayes theorem and bayesian networks, certainty factor. Expert Systems: Introduction to expert system and application of expert systems, various expert system shells, vidwanframe work, knowledge acquisition, case studies, MYCIN. Learning: Rote learning, learning by induction, explanation based learning. | Case Study | 6 |

# Case Study

**Rules/Instructions**

- Students are required to prepare Case study on any one of the topic.
- Typed (Properly formatted , at least 20 Pages with front page and index , summary )
- Students are required to upload the signed copy of case study on LMS within time line.
- It is an individual activity

**Topic : 1.** Exploring the Role of Machine Learning in Financial Fraud Detection: A Case Study of Credit Card Companies

It must consists of following points-

- Overview of types of frauds in the field of digital transactions.
- Emphasis should be given on literature review with respect to role of machine leaning in fraud detection as well as prevention.
- Supporting data survey by the reputed organization/Journals can be added to case study.
- References

Topic : 2

An Analysis of the Effectiveness of Expert Systems in Improving Decision Making in the Healthcare Industry

It must consist of following points -

- Key features of expert system.
- Architecture used in expert system
- Examples of expert system.
- Comparative study of expert systems used in healthcare Industry using literature survey.
- Results in graphs illustrating effectiveness of expert system in Improving Decision Making in the Healthcare Industry
- References

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Elaine Rich and Kevin Knight “Artificial Intelligence”-Tata McGraw Hill. Artificial intelligence” 4 ed. Pearson. |
| **Articles** | |
| **References Books** | Dan W. Patterson “Introduction to Artificial Intelligence and Expert Systems”, Prentice India. Nils J. Nilson “Principles of Artificial Intelligence”, Narosa Publishing House. M.Sasikumar,S.Ramani etc. “Rule based Expert System”, Narosa Publishing House. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 3 | 1 | 2 | 1 | 2 | - | - | - | 1 | - | - | - |
| CO2 | - | 3 | 3 | 2 | 3 | - | - | - | 1 | - | - | 1 | - | - | - |
| CO3 | - | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | - | - | 1 | - | - | - |
| CO4 | - | 3 | 2 | 2 | 3 | - | - | - | 2 | - | - | 1 | - | - | - |
| CO5 | - | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | - | - | 1 | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Cloud Computing |
| **Course Code** | BCA 502(B) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various technologies for information storage and management.**(BL1-Remember)**<br>**CO2-** To understand the storage techniques, concepts of data center, data center infrastructure management and services. **(BL2-Understand)**<br>**CO3-** To implement the setup of storage techniques such as RAID, LUN Masking at data center. Create the virtual server and virtualize the resources as on demand.**(BL3-Apply)**<br>**CO4-** To analyze the functionality of data center or storage infrastructure as per policies. **(BL4-Analyze)**<br>**CO5-** To evaluate the performance of data center or storage infrastructure on various performance parameters. **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG10(Reduced inequalities) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Storage Technology: Data proliferation, evolution of various storage technologies, Overview of storage infrastructure components, Information Lifecycle Management, Data categorization | Lecture with PPT, Audio/Video clips, Pictures, Quiz, Present Report | 12 |
| 2 | Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure components, properties, performance, and specifications, RAID levels, hot sparing | Lecture with PPT, Audio/Video clips, Pictures, Quiz, implementation on cloud tools | 12 |
| 3 | Introduction to Networked Storage: JBOD, DAS, NAS, SAN & CAS evolution and comparison. Applications, Elements, connectivity, standards, management. | Lecture with PPT, Audio/Video clips, Pictures, Quiz, Examples of real-life applications such as YouTube, Facebook, Instagram, WhatsApp, LinkedIn etc., | 12 |
| 4 | Hybrid Storage solutions; Virtualization: Memory, network, server, storage & appliances. Data center concepts & requirements, Backup & Disaster Recovery: Principles | Lecture with PPT, Audio/Video clips, Pictures, Quiz, Demonstration of third-party cloud environment | 12 |
| 5 | Information storage on cloud: Concept of Cloud, Cloud Computing, storage on Cloud, Cloud Vocabulary, Architectural Framework, Cloud benefits, Cloud Computing Evolution, Applications & services on cloud, Cloud service providers and Models, Essential characteristics of cloud computing, Cloud Security and integration. | Lecture with PPT, Audio/Video clips, Pictures | 12 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | G. Somasundaram, Alok Shrivastava (EMC Education Services) Editors; Information Storage and Management: Storing, Managing, and Protecting Digital Information; Wiley India.<br>Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi; Mastering Cloud Computing, Elsevier<br>Ulf Troppens; Storage Network Explained: Basic and Application of SAN, NAS; Wiley India. |
| **Articles** | |
| **References Books** | Nick Antonopoulos, Lee Gillam; Cloud Computing: Principles, System & Application, Springer.<br>John W. Rittinghouse, James F. Ransome; Cloud Computing: Implementation, Management and Security, CRC Press - Taylor Francis Publication. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO2 | 1 | 1 | - | - | 1 | - | 3 | - | - | - | - | 2 | 2 | 2 | 1 |
| CO3 | 1 | 2 | 2 | 2 | 2 | - | 3 | - | - | - | - | 2 | 3 | 3 | 2 |
| CO4 | 1 | 3 | 2 | 2 | 2 | - | 2 | - | - | - | - | 2 | 3 | 2 | 2 |
| CO5 | - | 3 | 2 | 2 | 2 | - | 2 | - | 2 | - | - | 2 | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BCA**

| | |
|---|---|
| **Title of the Course** | Mobile Application Development |
| **Course Code** | BCA 503-A(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | Prerequisites - Having the little overview about the object-oriented programming. | | | **Co-Requisite/s** | Prerequisites - Having the little overview about the object-oriented programming. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax rules of the programming language such as java and XML**(BL1-Remember)**<br>**CO2-** CO2: To understand Object Oriented concepts for Android and various mobile application development concepts including interface designing, handling multiple activities. **(BL2-Understand)**<br>**CO3-** To implement XML, Java and mysql for database connectivity and file system.**(BL3-Apply)**<br>**CO4-** To analyze various widgets and learn to use them as per the problem.**(BL4-Analyze)**<br>**CO5-** To develop solutions for real world problems using android application development.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Getting Started with Android - Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file | Lecturing | 9 |
| 2 | Android Application Design Essentials - Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions. Activity States and Life Cycle. XML : Tage, Namespaces. | Lecturing | 9 |
| 3 | Building Blocks of Mobile Apps - Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation. | PBL | 9 |
| 4 | SQLite (DBMS) Shared Preferences, Mobile Databases such as SQLite, Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources. | Case Study | 9 |
| 5 | Using Common Android APIs: Using Android Data and Storage APIs, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World. | Lecturing | 9 |

Part C


Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Android Wireless Application Development |
| **Articles** | |
| **References Books** | Charlie Collins, Michael D.Galpin, Matthias Kappler Android in Practice DreamTech Press 2016 |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO3 | 2 | - | - | - | 1 | - | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | - | - | - | 2 | 2 | 2 | - | 2 | - | - | 1 | 1 | 2 | 2 | 2 |
| CO5 | - | - | 1 | - | - | 2 | - | 1 | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Data Analytics |
| **Course Code** | BCA 503-B(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Specific Elective | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic python programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To understand the fundamentals of Big Data. **(BL1-Remember)**<br>**CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)**<br>**CO3-** CO3: To explore tools and practices for big data and Visualization.**(BL3-Apply)**<br>**CO4-** CO4: To recognize the role of business intelligence and visualization in decision making. **(BL4-Analyze)**<br>**CO5-** CO5: To analyze data using Power BI, Tableau etc. **(BL5-Evaluate)**<br>**CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction To Data Handling - Overview of Data analysis, Working with statistical formulas - Logical and financial functions, Data Validation & data models, Power Map for visualize data. | Lecturing | 9 |
| Unit-2 | Introduction To Data Manipulation - Using Function: Introduction to Power BI using data, Heat Map, Tree Map, Smart Chart, Column Chart, Line Chart, Pie, Bar, Area, Scatter Chart, Data Series, Chart Sheet , Trend line, Error Bars, What-If Analysis. | Lecturing,Experiments | 9 |
| Unit-3 | Data Visualization: Getting Start With Tableau &Amp; Power BI: Getting start with Tableau & Power BI: What is Tableau? What does the Tableau product suite comprise of? How Does Tableau Work? Tableau Architecture, What is My Tableau Repository? Connecting to Data & Introduction to data source concepts, Understanding the Tableau workspace, Dimensions and Measures, Data Types & Default Properties. Creating Dataset from data model in Power BI. | Lecturing,Experiments | 9 |
| Unit-4 | Data Strategy Understanding Product & Category, Competitive Analysis, Market Share understanding - Market potential Index, Seasonality-Sales Trending. | Lecturing,PBL | 9 |
| Unit-5 | Consumer behaviour Analytics - mind and market factors, Budget planning & Execution-MIMI, Regression Correlation Analysis for Sales trending. | Lecturing,PBL | 9 |

Part C

# BCA 503(B)-Elective-II

# Data Analytics

## List of Experiments

1. Install, configure and run python, numPy and Pandas.
2. Install, configure and run Hadoop and HDFS.
3. Visualize data using basic plotting techniques in Python.
4. Implement NoSQL Database Operations: CRUD operations, Arrays using MongoDB.
5. Implement Functions: Count – Sort – Limit – Skip – Aggregate using MongoDB.
6. Implement word count / frequency programs using MapReduce.
7. Implement a MapReduce program that processes a dataset.
8. Implement clustering techniques using SPARK.
9. Implement an application that stores big data in MongoDB / Pig using Hadoop / R.

ITM UNIVERSITY
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**PBL Submission Guideline**

**Subject Name: Data Analytics BCA 503 B**

**Total Marks : 30**

| Sr. No. | Submission to be done | Submission Required | Marks Allotment |
|---|---|---|---|
| 1 | Select Project Topic and team submission | Small presentation | 2 |
| 2 | Introduction & Objective of Project | PBL file | 3 |
| 4 | Background Study and the existing gap in particular area | PBL file | 5 |
| 5 | System Design (Flowcharts/Block Diagrams/ Algorithms/DFD/ERdiagrams),Implementation of code, and submission of Running model. | PBL File & Implementation | 10 |
| 7 | Final Project file submission (Strictly as per the format) | Presentation & Viva Voce | 10 |

**Topic List:**

Create PBL on any given Topic

1. Traffic control using Big Data
2. Search Engine
3. Medical insurance fraud detection
4. Data warehouse design for an E-Commerce site
5. Big Data Cyber security
6. Crime Detection
7. Disease prediction based on symptom
8. Recommendation System
9. Anomaly detection in Cloud Servers
10. Smart cities using Big Data
11. Tourist behavior analysis
12. Web Server Log analysis

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Eaton, C., Deroos, D., et al. (2017). Understanding Big Data. McGraw-Hill. |
| **Articles** | |
| **References Books** | Prajapati, V. (2016). Big Data Analytics with R and Hadoop. Packt Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | 1 | 2 | 2 | - | - | - | - | - | - | 2 | 3 | 3 |
| CO2 | 3 | - | 1 | 1 | 2 | 3 | - | - | - | - | - | - | 2 | 3 | 2 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | 2 | 3 | 3 |
| CO4 | 3 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO6 | 2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Ethical Hacking Fundamentals |
| **Course Code** | BCA 503-C(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Specific Elective | | | | | | | |
| **Pre-Requisite/s** | : An attendee of this course must have knowledge of Computer system and its components and should understand the types of data and data storage in computer system. Must be familiar with Linux Operating system, communication network and must have knowledge of Python or any other scripting language. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** An attendee will be able to remember the basics of computer networks, Network security, Threats in a network, social networks, attack domains and will be able to remember the defense mechanisms against all attacks. **(BL1-Remember)**<br>**CO2-** An attendee will understand the risks of being on network and possible attacks that can be done on a machine over internet gaining access on devices over network, social networks IOT Devices and methods to secure them.**(BL2-Understand)**<br>**CO3-** An attendee will be able to Apply the concepts learnt to identify the hardware and software vulnerabilities in sandbox environment, deploy an attack and will be able to develop countermeasures against attack vectors identified.**(BL3-Apply)**<br>**CO4-** An attendee will be able to analyze the methods used to deploy an attack and design preventive measures for network devices against various attacks and learn about their functionalities.**(BL4-Analyze)**<br>**CO5-** An attendee will be able to evaluate the methods used to exploit the attack vectors open for attacks over the network and record their performance in all possible domains. **(BL5-Evaluate)**<br>**CO6-** An attendee will be able to Create / design systems/algorithms for identifying attacks, reporting them and preventing them over the communication network.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Information Security Fundamentals, Cyber Kill Chain Methodology, Hacking Concepts and Hacker Classes, Different Phases of Hacking Cycle, Ethical Hacking Concepts, Scope, and Limitations, Ethical Hacking Tools, Threat and Threat Sources, Malware and its Types, Vulnerabilities, Vulnerability Assessment. | Whiteboard, PPT, Programming Labs | 8 |
| 2 | Password Cracking Techniques and Countermeasures, Password Cracking Techniques, Password Cracking Tools, Password Cracking Countermeasures, Social Engineering Concepts and its Phases, Social Engineering Techniques, Insider Threats and Identity Theft, Social Engineering Countermeasures. | Whiteboard, PPT, Programming Labs | 8 |
| 3 | Sniffing, Packet Sniffing Concepts, Sniffing Techniques, Sniffing Countermeasures, Denial-of-Service, DoS and DDoS Attacks, DoS and DDoS Attack Countermeasures, Session Hijacking, Session Hijacking Attacks, Session Hijacking Attack Countermeasures, Web Server Attacks, Web Server Attacks, Web Server Attack Countermeasures, Web Application Attacks, Web Application Architecture and Vulnerability Stack, Web Application Threats and Attacks, Web Application Attack Countermeasures, SQL Injection Attacks, SQL Injection Attacks, SQL Injection Attack Countermeasures. | Whiteboard, PPT, Programming Labs | 8 |
| 4 | Wireless Terminology, Wireless Encryption, Wireless Network-Specific Attack Techniques, Bluetooth Attacks, Wireless Attack Countermeasures, Mobile Attack Anatomy, Mobile Platform Attack Vectors and Vulnerabilities, Mobile Device Management (MDM) Concept, Mobile Attack Countermeasures. | Whiteboard, PPT, Programming Labs | 8 |
| 5 | IoT Attacks, IoT Concepts, IoT Threats and Attacks, IoT Attack Countermeasures, OT Attacks, OT Concepts, OT Threats and Attacks, OT Attack Countermeasures. Cloud Computing Concepts, Container Technology, Cloud Computing Threats, Cloud Attack Countermeasures. Fundamentals of Penetration Testing and its Benefits, Strategies and Phases of Penetration Testing, Guidelines and Recommendations for Penetration Testing. | Whiteboard, PPT, Programming Labs | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Assignment | Experiments | BL2-Understand | 8 |
| 3-4 | Activity | Experiments | BL3-Apply | 10 |
| 1-5 | Project | Case Study | BL4-Analyze | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Matt Walker CEH Certified Ethical Hacker All-in-One Exam Guide, Second Edition 2nd Edition |
| **Articles** | Patrick Engebretson The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy (Syngress Basics Series) 1st Edition Syngress Basics Series |
| **References Books** | Hein Smith (Author), Hilary Morrison (Author) Ethical Hacking: A Comprehensive Beginners Guide to Learn and Master Ethical Hacking |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO2 | 1 | 1 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO3 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO4 | 1 | 1 | 1 | 2 | 3 | - | - | - | - | - | - | - | 1 | 3 | 1 |
| CO5 | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO6 | - | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 |

# Syllabus-2023-2024

**BCA**

| | |
|---|---|
| **Title of the Course** | Enterprice Resource Planning |
| **Course Code** | BCA 506 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 5th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand- Comprehensive knowledge of the introduction of different applications of ERP systems**(BL2-Understand)**<br>**CO2-** Applying: understand the importance of erp and be able to identify and describe typical functional modules in ERP system.**(BL3-Apply)**<br>**CO3-** Analyzing: have a case study of erp design and implementation and describe the basic concepts and technologies used in ERP.**(BL4-Analyze)**<br>**CO4-** Creating: develop projects requiring the implementation of various data structures. Students are able to understand the future scope of ERP.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Introduction: ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, the Evolution of ERP, and the Structure of ERP. | Lecturing | 9 |
| Unit 2 | ERP Technologies: Business Process Reengineering, MIS, DSS, Data Warehousing, Data Mining, Online Analytic Processing (OLAP), Supply chain Management. | Lecturing | 8 |
| Unit 3 | ERP Functional Modules: Business modules, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution , Production Planning, Production Scheduling, Production Control | Lecturing | 9 |
| Unit 4 | ERP Implementation: ERP Implementation Basics, ERP Implementation Life Cycle, Role of SDLC/SSAD, Object Oriented Architecture, Consultants, Vendors and Employees | Lecturing | 9 |
| Unit 5 | ERP & E-Commerce: ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. | Lecturing | 10 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Leon. (2007). ERP Demystified, 2/e. Tata McGraw-Hill Education.<br>Garg, V. K., & Venkitakrishnan, N. K. (2003). ENTERPRISE RESOURCE PLANNING. PHI Learning Pvt. Ltd. |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | 2 | - | - | - | - | - | - | 1 | 2 | 1 | 3 |
| CO2 | 3 | 3 | 2 | - | 2 | - | - | - | - | - | - | 2 | 3 | 1 | 2 |
| CO3 | 2 | 3 | - | 3 | 2 | - | - | - | - | - | - | 2 | 1 | 3 | 2 |
| CO4 | 2 | 2 | 3 | 2 | 3 | - | - | - | 2 | 2 | 3 | 3 | 3 | 2 | 1 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Data Ware housing and mining |
| **Course Code** | BCA 601 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | Student should be familiar with Discrete Mathematics, Probability, Statistics, Data structures and basics of RDBMS. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the Data mining techniques that help extract meaningful data.**(BL1-Remember)**<br>**CO2-** To understand the basics of Data warehouse, Data marts, data preprocessing and techniques of data mining.**(BL2-Understand)**<br>**CO3-** To implement the various methods of data mining for data clustering, classification: K-means, K- Medoids etc.**(BL3-Apply)**<br>**CO4-** To analyze the concepts of data Preprocessing, Association Rule Mining, classification, clustering.**(BL4-Analyze)**<br>**CO5-** To evaluate the data mining models that run efficiently.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG10(Reduced inequalities) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Data Warehouse Concepts: Architecture, operations, Multidimensional Data Model, Data Warehouse Implementation, Data Cube Technology, Aggregation, OLAP functions and tools. | Lecturing, Case study | 6 |
| 2 | Needs of Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage, Concept Hierarchies – Concept Description Data Generalization and Summarization Based Characterization | Lecturing, Research | 12 |
| 3 | Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Mining Primitives, Languages, and System Architectures, Architectures of Data Mining Systems, Classification by Decision Tree Induction , Bayesian Classification. Association Rule Mining, Mining, Single-Dimension Association Rules from Transactional Databases, Mining Multilevel ,Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining | Lecturing | 5 |
| 4 | Clusters Analysis: What is cluster analysis, Types of Data in Cluster Analysis, Categorization of Major Clustering Methods – Partitioning Methods : K-Means and K-Medoids, Hierarchical methods: Agglomerative and divisive clustering. | Lecturing ,Research | 12 |
| 5 | Applications of Data mining: Various areas of data mining with their features and specific design of mining system needed – Text Mining, | Lectures with whiteboard/PPT, Recorded video/interactive videos, | 4 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Case Study on data warehouse architecture,schema & operations | Case Study | BL4-Analyze | 4 |
| 1-4 | Problem Based Learning | PBL | BL6-Create | 5 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Han, J., Kamber, M., & Pei, J. (2011, June 9). Data Mining: Concepts and Techniques. |
| **Articles** | |
| **References Books** | Resources, M. A. I. (2012, November 30). Data Mining: Concepts, Methodologies, Tools, and Applications. |
| **MOOC Courses** | |
| **Videos** | Data Mining Introduction: https://www.youtube.com/watch?v=ykZ-_UGcYWgRule Generation:https://archive.nptel.ac.in/courses/106/105/106105174/ |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | - | - | 1 |
| CO2 | - | 1 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | 2 | 2 | - | 2 | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Image Processing |
| **Course Code** | BCA 602 (A)(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | Prerequisite: student must be familiar with the following: ❖ Undergraduate level mathematics. ❖ Programming in MatLab. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of digital image processing.**(BL1-Remember)**<br>**CO2-** To understand the fundamental concepts of a digital image processing system.**(BL2-Understand)**<br>**CO3-** Apply the concepts learnt in to design and implement with Matlab algorithms for digital image processing operations such as histogram equalization, enhancement, restoration and filtering.**(BL3-Apply)**<br>**CO4-** Analyze the concept of designing after applying these techniques in various applications.**(BL4-Analyze)**<br>**CO5-** Evaluate the theoretical knowledge and practical skills on digital image processing.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Digital Image Introduction: Steps in Digital Image Processing and the Need for Digital Image Processing, Application and Components of Image Processing System. Visual Preliminaries: Brightness Adaptation and Contrast, Neighborhood of pixel, D4, D8 and Dm distances, Adjacency, path and connectivity. | Lecturing | 15 |
| 2 | Image Processing Image Enhancement: Contrast Stretching, Smoothing, Image Averaging, Mean Filter, Ordered Statistic Filter: Median Filter, Low Pass Filtering. Image Sharpening, High, Pass Filtering, Homomorphic Filtering. | Lecture and experiments | 10 |
| 3 | Image Transformation Basic Intensity Transformation Functions, Histogram, Histogram Equalization, Histogram Matching, Spatial Correlation and Convolution Error Criterion: Lossy Compression methods, loss –less compression, Huffman coding, Run length coding- Block coding, Quad Tree coding- contour coding. | Lecture and experiments | 15 |
| 4 | Color Processing and Image Segmentation: Color Fundamentals, RGB, CMY and HSI Color Models, Image Segmentation: Edge Models, Edge Detection, Global and Variable Thresholding, Single and Multiple Thresholds, Region Based Segmentation. | Lecture and experiments | 10 |
| 5 | Morphology, Representation and Description: Mathematical Morphology, Erosion and Dilation, Opening and Closing, Boundary Extraction algorithm. Border Following Algorithm, Chain Codes, Minimum Perimeter Polygons, Boundary Descriptors, Regional Descriptors. | Lecture and experiments | 15 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 2-5 | PBL Format | PBL | BL5-Evaluate | 40 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Gonzalez, R. C., & Woods, R. E. (2008). Digital Image Processing (3rd ed.). Pearson Education Inc. |
| **Articles** | |
| **References Books** | Jain, A. K. (1989). Fundamentals of Digital Image Processing. Prentice Hall.<br>Gonzalez, R. C., Woods, R. E., & Eddins, S. L. (2020). Digital Image Processing using Matlab. McGraw Hill Education. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | 1 | 2 | - | - | - | 2 | - | - | 2 | 2 | 1 |
| CO2 | 1 | - | - | - | 1 | 2 | - | - | - | - | - | - | 2 | 2 | 3 |
| CO3 | 2 | 2 | - | 2 | - | - | - | - | - | - | - | - | 1 | - | 2 |
| CO4 | 1 | 2 | - | 1 | - | - | - | - | - | - | - | - | 1 | 2 | 2 |
| CO5 | 1 | 2 | - | 1 | - | - | - | - | - | - | - | - | 1 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Machine Learning |
| **Course Code** | BCA 602(B) (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Statistical Data Analysis and visualization methods, and Python Programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of data science.**(BL1-Remember)**<br>**CO2-** To understand various Performance evaluation techniques of Machine Learning models. **(BL2-Understand)**<br>**CO3-** To implement various supervised, unsupervised and reinforcement machine Learning Models **(BL3-Apply)**<br>**CO4-** To train & test various machine Learning models using different domains of dataset. **(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the performance of various machine learning models using statistical & visualization tools**(BL5-Evaluate)**<br>**CO6-** To create machine learning models to solve real world problems.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG10(Reduced inequalities)<br>SDG11(Sustainable cities and economies) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of Machine Learning: What is Machine Learning, Need for Machine Learning, Why & When to Make Machines Learn?, Machine Learning Model, Challenges in Machines Learning, Applications of Machines Learning, Overview of various machine Learning Algorithms, Performance evaluation measures for machine learning algorithms, the curse of dimensionality, Data Feature Selection, Training Data vs. Validation Data vs. Test Data for ML Algorithms, bias-variance trade off, over fitting vs under fitting. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 12 |
| 2 | Supervised Learning-I Regression: Introduction to Regression, Types of Regression Models, Introduction to Linear Regression, Simple Linear Regression, Least square regression, Gradient Descent , Multiple Linear Regression (MLR), Regularization in Linear Regression, Ridge regression, Lasso regression, Polynomial Regression, Support Vector for Regression (SVR). | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 12 |
| 3 | Supervised Learning-II Classification – Introduction to Classification, Types of Learners in Classification, Logistic Regression, K-Nearest Neighbors (K-NN), Support Vector Machine (SVM), Kernel SVM, Naive Bayes, Decision Tree Classification, Random Forest Classification. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 12 |
| 4 | Unsupervised Learning Clustering- Introduction to Clustering, Types of Clustering, Types of Clustering Algorithms, K-Means Clustering, Hierarchical Clustering, DBSCAN Clustering, Association Rule Learning: Introduction to Association Rule Learning, Types of Association Rule Learning, Apriori Algorithm, Eclat Algorithm, F-P Growth Algorithm, Applications of Association Rule Learning. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 12 |
| 5 | Reinforcement Learning: Introduction of Reinforcement Learning, Terms used in Reinforcement Learning, Key Features, Elements of Reinforcement Learning, How does Reinforcement Learning Work?, The Bellman Equation, Types of Reinforcement learning, Markov Decision Process, Reinforcement Learning Algorithms, Reinforcement Learning Applications Performance Improvement of ML Models: Performance Improvement with Ensembles, Ensemble Learning Methods, Bagging Ensemble Algorithms, Boosting Ensemble Algorithms, Voting Ensemble Algorithms. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 12 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Implementation of various performance evaluation techniques of machine learning | Experiments | BL3-Apply | 02 |
| 2 | Implementation of various regression models of machine learning | Experiments | BL3-Apply | 04 |
| 3 | Implementation of various classification models of machine learning | Experiments | BL3-Apply | 03 |
| 4 | Implementation of various clustering models of machine learning | Experiments | BL3-Apply | 03 |
| 5 | Implementation of RL, bagging and boosting models of machine learning | Experiments | BL3-Apply | 03 |
| 1-5 | Problem Based Learning | PBL | BL6-Create | 15 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Andreas C. Müller, Sarah Guido.(2016).Introduction to Machine Learning with Python: A Guide for Data Scientists.1st ed.O'Reilly Media. |
| **Articles** | |
| **References Books** | Tom M. Mitchell.(2017).Machine Learning.1st ed.McGraw Hill Education.<br>Dr S. Sridhar, Dr M. Vijayalakshmi.(2021).Machine Learning.1st ed. Oxford University Press.<br>Manaranjan Pradhan, U Dinesh Kumar.(2019).Machine Learning using Python.1st ed. Wiley India. |
| **MOOC Courses** | Prof. S. Sarkar.(2023).Introduction to Machine Learning, IIT Kharagpur.https://nptel.ac.in/courses/106105152 Dr. Balaraman Ravindran.(2024).Introduction to Machine Learning, IIT Madras.https://nptel.ac.in/courses/106106139 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | 2 | 3 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Digital Forensic Essentials |
| **Course Code** | BCA 602(C)-T |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 1 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of computer fundamentals, hardware, algorithms and basic concepts of network. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remembering Computer Network basics and Network Defense Essentials**(BL1-Remember)**<br>**CO2-** Understand the concepts of Digital Forensics Digital investigation, Digital crime scene Evaluation process**(BL2-Understand)**<br>**CO3-** Apply to the identification of crime and investigate (apply).**(BL3-Apply)**<br>**CO4-** Analyze the data from digital devices for forensic analysis and finalize the audit report(Analyse)**(BL4-Analyze)**<br>**CO5-** Evaluating Evaluation of various crimes and the techniques applied to perform the crimes in digital world.(Investigate)**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG10(Reduced inequalities) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Digital Forensics Digital investigation, Digital crime scene evaluation process, Search & Seizure, Digital Forensic Lab Setup, Dead v/s Live Forensics, Types of Digital Evidences, Disk Imaging, Write Blockers, Data Recovery, Chain of Custody, Standard Operating Procedures, Investigation Guidelines, overview of tools, Slack Space, Virtual paging, Volatile Evidence Acquisition, Collection & Analysis | Lecturing, Experiments | 7 |
| 2 | Volume Analysis & File Systems Introduction, PC based partitions- DOS partitions, UNIX partitions, RAW partition, UNIX Console Log, Removable media, Server based partitions- BSD partitions, GPT & MBR partitions, multiple disk volumes- RAID, Disk Spanning, file system, File system category, FAT concepts and analysis, FAT data structure- Boot sector, FAT 32 FS info, Directory entries, Long file name directory entries, NTFS File System concepts, NTFS Analysis, NTFS data structure, Standard file attributes, Index attributes and data structures | Lecturing, Case Study, Experiments | 8 |
| 3 | Digital Evidence Analysis Potential Evidences, Evidence collection form different devices, Artifact interpretation, Operating System artifacts analysis, Network Artifacts analysis, File Signatures, Registry Forensics, Last user Activity, MRU, NTUSER.DAT, MFT concepts, MFT Forensics,Multimedia Forensics, Metadata Analysis, Browser Forensics, History Extraction, Cookies based artifacts, Autofill Forms, Cache, Temp file, MAC OS Artifacts analysis, Linux OS Artifact Analysis | Lecturing, Case Study, Experiments | 10 |
| 4 | NIX File Systems UNIX, Ext2 and Ext3 data structures, iNodes, Super block, group descriptor tables, Block bitmap, Extended attributes, Directory Entry, Symbolic Link, Hash trees, Journal data structures, UFS1 and UFS2 concepts and analysis, NFS Files Systems, HFS File Systems, CDF File systems, Hadoop File systems | Lecturing, Case Study, Experiments | 8 |
| 5 | Forensic Tools :Forensic tools collection, Automated v/s manual techniques, Open source forensic tools, Developing scripted tools for basic level investigation, Usage tools for disk imaging and Data recovery, Encase and FTK tools, Autopsy, UFED, XRY, Volatility, Rekall, RedLine, NetworkMiner, Anti forensics Techniques, Counter anti forensics. | Lecturing, Case Study, Experiments | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Survey | Field work | BL3-Apply | 2 |
| 3-4 | Case Study | Case Study | BL4-Analyze | 4 |
| 1-5 | Lab Exercise | Experiments | BL5-Evaluate | 30 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Carvey, H. A. (2014). Windows Forensic Analysis Toolkit: Advanced Analysis Techniques for Windows 7. Syngress. |
| **Articles** | |
| **References Books** | Marshall, A. M. (2008). Digital Forensics: Digital Evidence in Criminal Investigation. Wiley-Blackwell. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| CO2 | - | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 2 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 3 |
| CO5 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BCA**

| | |
|---|---|
| **Title of the Course** | Computer GRaphics and Multimedia |
| **Course Code** | BCA 603-C |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Generic Elective | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of computer fundamentals, programming in 'C', and mathematical concepts | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Toremember variousconceptsofcomputerfundamentals**(BL1-Remember)**<br>**CO2-** TounderstandtheBasicconceptofComputerGraphicsandMultimediaSystem.**(BL2-Understand)**<br>**CO3-** ToimplementvariousalgorithmsinC/C++likeDDA,Circledrawing etc.**(BL3-Apply)**<br>**CO4-** To analyze functioning of differentcomputer graphicsalgorithms andvarious transformation techniques.**(BL4-Analyze)**<br>**CO5-** Toevaluatetheperformancecharacteristicsofvariouscomputergraphics algorithms.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit-1 | IntroductiontoComputerGraphics Computer Graphics introduction, Types of Computer Graphics, Application areas of Computer Graphics. Overview of Graphics System: Pixels, Frame Buffer, Display Controller, Lookup Table, Resolution, Aspect Ratio, Persistence, CRT, DVST. Raster and Random Scan Displays: Raster Scan Display, Random Scan Display. Color CRT Monitors: Beam Penetration CRT, Shadow Mask CRT. | Lecturing | 12 |
| Unit-2 | OutputPrimitives Scan Conversion and its Side effects, Output Primitives: Points and Lines. Line Drawing Algorithms: DDA Algorithm, Bresenhem's Line Drawing Algorithm. Circle drawing Algorithms: Properties of Circle, Bresenham's Circle Drawing Algorithm, Mid-Point Circle Drawing Algorithm | Lecturing | 10 |
| Unit-3 | 2D Geometrical Transformations: Translation, Rotation, Scaling, Shearing. Homogeneous Coordinates, Composite Transformations. Reflection. 3D Geometrical Transformations: Translation, Rotation, Scaling, and Reflection. 2D Windowing and Clipping: Window, Viewport, WCS, NDCS, Window to Viewport Coordinate Transformation. Line Clipping: Cohen Sutherland Algorithm, Midpoint Subdivision Algorithm. Polygon Clipping: types of polygons, Sutherland Hodgeman Polygon Clipping. | Lecturing | 10 |
| Unit-4 | ProjectionandCurves Projection:ParallelandPerspective. 3DObjectRepresentation:BezierandB-splineCurve. Color Models like RGB, CMY, YIQ, HSV and HLS. | case Stduy | 12 |
| Unit-5 | Multimedia Multimedia:Introduction,MultimediaComponents,Applications,FileFormats–RTF,TIFF,MIDI,JPEG,DIB,MPEG. Animation:Introduction,Rules,DifferentAnimation Techniques | case StduyLectures with whiteboard/PPT, | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Unit-4&5 | Case Study | Case Study | BL4-Analyze | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 0 | 0 | 0 | 0 | 0 | 0 |

Part E

| | |
|---|---|
| **Books** | Computer Graphics Donald Hearn,M.P.Baker |
| **Articles** | |
| **References Books** | Procedural Elements for Computer Graphics DavidF. Rogers |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 2 | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 3 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | - | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | 1 | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Major Project |
| **Course Code** | BCA 606 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Field Projects | | | | | | | |
| **Pre-Requisite/s** | sofetware development life cycle, Project life cycle | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 : Understand the project Develpoment Life Cycle **(BL2-Understand)**<br>**CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)**<br>**CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)**<br>**CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Understanding concept of Human Resource Management Concept, nature, scope, objectives and importance of HRM, Evolution of HRM, Challenges of HRM, Personnel Management vs HRM, Difference between PM and HRM, Role of HR Professional / Manager, Qualities of successful HR. Structure of HR Department, line and staff aspects of HRM. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 6 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Develop Synopsis for the proposed / chosen topic | PBL | BL2-Understand | 10 |
| 2 | Develop prototype of the ysstem proposed | PBL | BL3-Apply | 30 |
| 3 | Performa testing on the modules and the ysstme as a whole | Experiments | BL4-Analyze | 10 |
| 4 | incoporate the changes required based on testing result | PBL | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 2 | - | - | 2 | - | - | 1 | - | - | 2 | 1 | 2 |
| CO2 | - | - | - | 2 | - | - | 2 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO3 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | - | - | - | 1 | - | - | - | - | - | 2 | - | - | 1 | 1 | 3 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Research Methodology |
| **Course Code** | BCA 701 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Interdisciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Familiarity with basic research concepts recommended. Openness to learn diverse research methodologies essential for advanced academic inquiry. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Scholars will recall and identify various research methodologies, distinguishing between quantitative and qualitative approaches. **(BL1-Remember)**<br>**CO2-** Scholars will analyze and evaluate principles of research design, critically assessing the appropriateness of different methodologies for specific research questions. **(BL2-Understand)**<br>**CO3-** Scholars will apply research methods to formulate hypotheses and research questions, integrating theoretical frameworks and empirical evidence. **(BL3-Apply)**<br>**CO4-** Scholars will critically assess different techniques of data collection, selecting and justifying appropriate methods for their research projects. **(BL4-Analyze)**<br>**CO5-** Scholars will interpret and analyze research findings using appropriate statistical and qualitative analysis techniques, drawing meaningful conclusions from the data. **(BL5-Evaluate)**<br>**CO6-** Scholars will communicate research results effectively through written reports, presentations, and other dissemination methods, demonstrating clarity, coherence, and professionalism. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Concept of Research & types of research Motivation and objectives – Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 2 | Research Formulation Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis. Hypothesis – Different Types – Significance – Development of Working Hypothesis, Null hypothesis | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 3 | Research Design and Methods Research design – Basic Principles- Need of research design –- Features of good design – Important concepts relating to research design – Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models. Developing a research plan - Exploration, Description, Experimentation. Determining experimental and sample designs. Research Methods- Scientific method vs Arbitrary Method, Logical Scientific Methods: Deductive, Inductive, Deductive-Inductive, pattern of Deductive – Inductive logical process – Different types of inductive logical methods. | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 4 | Data Collection & Analysis Sources of Data – Primary, Secondary and Tertiary – Types of Data – Categorical, nominal & Ordinal. Methods of Collecting Data: Observation, field investigations, Direct studies – Reports, Records or Experimental observations. Sampling methods – Data Processing and Analysis strategies- Graphical representation – Descriptive Analysis – Inferential Analysis- Correlation analysis – Data Analysis using statistical package. | Interactive Lectures, Case Studies, Experiential Learning | 9 |
| 5 | Scientific Writing Structure and components of Scientific Reports – types of Report – Technical Reports and Thesis –Significance – Different steps in the preparation – Layout, structure and Language of typical reports - Illustrations and tables – Bibliography, Referencing and foot notes –Importance of Effective Communication. Preparing Research papers for journals, Seminars and Conferences – Design of paper using TEMPLATE, Calculations of Impact factor of a journal, citation Index, ISBN & ISSN. | Interactive Lectures, Case Studies, Experiential Learning | 9 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (2nd ed.). Sage Publications.<br>Booth, W. C., Colomb, G. G., & Williams, J. M. (2008). The craft of research (4th ed.). Chicago: University of Chicago Press. |
| **Articles** | |
| **References Books** | Babbie, E. R. (2019). Essentials of social research: Methods and applications (8th ed.). Wadsworth Cengage Learning. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 2 | - | - | - | - | - | - | 2 | - | - |
| CO2 | - | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | 2 | - | 3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | - | 3 | 3 | 3 | 2 | 2 | - | - | - | - | - | - | 3 | 2 | - |
| CO5 | - | - | 2 | 2 | 3 | - | - | - | - | - | - | - | 3 | 2 | - |
| CO6 | 3 | 3 | - | 3 | 2 | 2 | - | - | - | - | - | - | 3 | 3 | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Research Publication Ethics |
| **Course Code** | BCA 702 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Specific Elective | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 : Research design, writing formats, graph plotting, presentation of research and IPR Plagiarism**(BL2-Understand)**<br>**CO2-** CO2 : locate research problem areas & identify problem & plan, organize design **(BL3-Apply)**<br>**CO3-** CO3 : Analyze research gaps **(BL4-Analyze)**<br>**CO4-** CO4 : Develop competency to write and present research reports.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit I | Introduction to Research: Meaning of research problems, type of research, source of information, research processes-problem formulation, research problems, curiosity and research, good and bad research ,Vis-à-vis invention and discovery. | ppt, discussion, Lecture | 8 |
| Unit II | Research Writing & Document formations: Types of reports, Integral parts presentation, standard report formats, research proposals. development of oral presentation referencing. Basic concept of Paper writing and report generation, writing Research Abstract, Introduction, review of literature, Result, Conclusion, Formats for publication in research general. | ppt, Discussion, Lecture | 10 |
| Unit III | Graph plotting, analysis of graphs & results, pretest of tools, Graph designing using tools –Origin or graph plotter etc. choice of data collection methods. Spread sheet tool-Introduction, function & features, using formula, generating charts, graph etc. | ppt, Discussion | 9 |
| Unit IV | Presentation Tools, features and functions, method to search required information effectively, reference management, software like Zotero/Mendeley, Software for paper formatting like Latex/MS office, Software for detect of plagiarism Academic databases | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 12 |
| Unit V | Broader issues in Research: Ethical issues, intellectual honesty, intellectual property right &patent, Historical and philosophical aspects of research and Plagiarism. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Unit II-IV | Assignment | Experiments | BL3-Apply | 15 |
| Unit I-V | Research Article | Research Paper Presentation | | |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | 1. Kothari, C. R. Research Methodology (Methods and techniques), New age Publisher |
| **Articles** | |
| **References Books** | 2. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 3. Michael P. Marder, Research Methods- Sciences, Canbridge Press. 4. R. Panneerselvam, Research Methodology, PHI Publication. 5. Raymond Greenlaw, Inline/Online: Fundamentals of the Internet and the World Wide Web, Tata McGraw Hill Co. Ltd. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | - |
| CO2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 1 | - | - |
| CO3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 |
| CO4 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Big Data Analytics |
| **Course Code** | BCA 703- B(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 7th | **Credits** | L | T | P | C |
| | | | | | 4 | 0 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | DBMS | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To understand the fundamentals of Big Data.**(BL2-Understand)**<br>**CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)**<br>**CO3-** CO3: To explore tools and practices for big data and Visualization. **(BL3-Apply)**<br>**CO4-** CO4: To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)**<br>**CO5-** CO5: To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)**<br>**CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Big Data: Fundamentals of Big Data, defining big data, building successful big data management architecture, big data journey Big Data Types: Structured and unstructured data types, real time and non-real time requirements. Distributed Computing: History of distributed computing, basics of distributed computing | Lectures with whiteboard/PPT, Recorded video | 6 |
| Unit-2 | Big Data Technology Foundation: Big Data stack, redundant physical infrastructure, security infrastructure, operational databases, organising data services and tools, analytical data warehouse, big data analytics Virtualization: Basics of virtualization, hypervisor, abstraction and virtualization, implementing virtualization with big data Cloud and Big Data: Defining cloud, cloud deployment and delivery models, cloud as an imperative for big data, use the cloud for big data | Lectures with whiteboard/PPT, Recorded video | 10 |
| Unit-3 | Visualization: data visualization, appropriate data visualization technique for given data, design visualizations, dashboard Operational Databases: Relational database, nonrelational database, key-value pair databases, document databases, columnar databases, graph databases, spatial databases MapReduce Fundamentals: Origin of MapReduce, map function, reduce function, putting map and reduce together, optimizing map reduce. | Lectures with whiteboard/PPT, Recorded video | 15 |
| Unit-4 | Hadoop: Discovering Hadoop, Hadoop distributed file system, Hadoop MapReduce, Hadoop file system, dataflow, Hadoop I/O, data integrity, compression, serialization, file-based data structure | Lectures with whiteboard/PPT, Recorded video | 9 |
| Unit-4 | Introduction to Hadoop Ecosystem: Avro - Avro data types and schemas, in-memory serialization and deserialization, avro datafiles, schema resolution Pig-Comparison with databases, pig latin, user defined functions, data processing operators Hive-Running hive, comparison with traditional databases, HiveQL, tables, querying data, user defined functions | Lectures with whiteboard/PPT, Recorded video | 5 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| Unit 3-5 | | PBL | BL6-Create | 18 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Big Data Fundamentals: Concepts, Drivers & Techniques) Big Data Analytics with R and Haoop", Packet Publishing. |
| **Articles** | |
| **References Books** | Hadoop in Action, MANNINGHadoop in Practice, Second Edition.. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | - | - | 2 | - | 1 | - | - | 1 | - | 2 | 2 | 1 | 2 |
| CO2 | 3 | 3 | - | - | 3 | - | 1 | - | - | 1 | - | 2 | 2 | 1 | 3 |
| CO3 | 3 | 3 | 3 | 2 | 3 | - | 2 | - | 2 | 2 | 1 | 2 | 2 | 1 | 2 |
| CO4 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | - | 2 | 3 | 2 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 3 | 2 | 3 | 3 | - | 2 | - | 2 | 3 | 2 | 3 | 2 | 3 | 3 |
| CO6 | 3 | 3 | 3 | 3 | 3 | - | 2 | - | 3 | 3 | 3 | 3 | 2 | 3 | 3 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Dissertation |
| **Course Code** | BCA 801 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 4th | **Semester** | 8th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 15 | 15 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Research Project | | | | | | | |
| **Pre-Requisite/s** | Knowledge of programming languages | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Conduct in-depth research and critically analyze existing solutions in the chosen project area within computer science or information technology. (Evaluate) **(BL5-Evaluate)**<br>**CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design) **(BL6-Create)**<br>**CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop) **(BL6-Create)**<br>**CO4-** CO4: Apply project management principles to plan, schedule, track progress, manage resources, and mitigate potential risks throughout the project lifecycle. (Plan and Organize) **(BL4-Analyze)**<br>**CO5-** CO5: Effectively document the project, including system design, implementation details, user manuals, deployment procedures, and future enhancements. (Communicate) **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✓<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| M | | | |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I | Literature survey | PBL | BL5-Evaluate | 50 |
| I | Synopsis, proposed system methodology | PBL | BL6-Create | 50 |
| I | implementation of proposed methodology | PBL | BL6-Create | 50 |
| I | Documentation of results and comparisons with similar technologies / methods | PBL | | 50 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 400 | 200 | 250 | 125 | 150 | 0 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 1 | - | 2 | - | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 1 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | 1 | 1 | - | 2 | - | - | - | - | 1 | - | - | - | 2 | 2 | 1 |
| CO5 | - | - | - | - | 1 | - | - | - | - | 1 | - | - | 2 | 1 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Digital Computer Principles |
| **Course Code** | BCA- 204 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | An attendee of this course should be familiar with the types of signals (Digital and Analog) and should have knowledge about Decimal number system and basics of Mathematics and must have logical aptitude. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** the basic function and data flow in computers along with its major units participating in data transfers. Revisiting Decimal Number systems**(BL1-Remember)**<br>**CO2-** Will be able to understand The basics of Number system, Number representation in computer, working of Digital Circuits with cloak signals and minimizing the digital circuits. **(BL1-Remember)**<br>**CO3-** Will be able to apply the concepts to design the combinational and sequential circuits and minimizing the circuits.**(BL3-Apply)**<br>**CO4-** Will be able to analyze the circuits designed with respect to input signals and outputs generated and studying the working and comparing the circuits.**(BL4-Analyze)**<br>**CO5-** Will be able to Evaluate and investigate the performance of the digital circuits designed for different set of inputs**(BL5-Evaluate)**<br>**CO6-** Will be able to Design and build digital circuits (Combinational and Sequential) on simulators (logisim) and testing their working.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Data types and Number systems, Binary number system, Octal & Hexadecimal number system,1's & 2's complement, Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes. | Lecturing | 10 |
| 2 | Logic Gates, AND, OR, NOT GATES and their Truth tables, NOR, NAND & XOR gates, Boolean Algebra. | Lecturing | 7 |
| 3 | Basic Boolean Law's, Demorgan's theorem, MAP Simplification, Minimization techniques, K -Map, Sum of Product & Product of Sum. | Lecturing | 7 |
| 4 | Combinational Circuits: Half Adder & Full Adder, Full subtractor, Multiplexer, Demultiplexer, Encoder, Decoder. Sequential Circuits: Flip-flops - RS, D, JK & T Flip-flops | Lecturing | 8 |
| 5 | Sequential Circuits: Buffer register, Shift Registers (Right &Left Shift register, Bidirectional Shift register), Counters: Ripple counter, Binary Counter,MOD-10 Counter,Ring Counter. Concept of bus, data movement among registers. | Lecturing | 7 |

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# PROJECT BACE LEARNING ACTIVITY
# BCAH-102

| S.no | Title of Activity | Outcome of the activity |
|---|---|---|
| 1 | Study of Number System | This activity help to study for better understanding of digital Number system and relation between different numbers |
| 2 | Study of various types of circuit and working principles of circuit | This activity help to study for better understanding of various types of digital circuit and functions of circuit. |
| 3 | Study of Combinational and Sequential circuits | This activity help to study for better understanding of various types of Combinational and Sequential circuits in digital electronics |
| 4 | Study of different set of inputs | This activity help to study for better understanding of different set of inputs |
| 5 | Study of various logic chips (IC) | This activity help to study for better understanding of various types of logic circuit and IC chips in digital electronics |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Mano, M. M. (2020). Computer System Architecture. Prentice Hall of India. |
| **Articles** | Bartee, T. C. (1972). Digital Computer Fundamentals. Tata McGraw-Hill. |
| **References Books** | Bartee(2001). Digital Computer Fundamentals. TMH Publication. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| CO2 | 2 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO3 | 1 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO4 | - | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | 1 | - | - | - | 2 | - | - | - | 1 | - | - | - | 2 | 3 | 3 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Programming in C |
| **Course Code** | BCA-103[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | basic knowledge computer file system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To understand the fundamentals of Big Data.**(BL1-Remember)**<br>**CO2-** CO2:To understand various C programming Concepts, array and function handling, pointer and structure.**(BL2-Understand)**<br>**CO3-** CO3: To implement Array, structure for data storage, modular programming concepts for solving a big problem into smaller parts.**(BL3-Apply)**<br>**CO4-** CO4: To analyze various decision making and iteration techniques to learn how to improve the performance of the C programs.**(BL4-Analyze)**<br>**CO5-** CO5: To evaluate and compare various data access techniques using pointers.**(BL5-Evaluate)**<br>**CO6-** CO6: To develop solutionsfor realworld problems usingArray,Structure,function and pointers.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Fundamentals of C Programming: Overview of C, features of C, IDE of C History of Structure of a C Program; Data types; Datatypes (Examples), C basic Input / Output functions, Constant ,Variable, Identifier, literals, and Keywords, naming variables: Scope and Life of Variables - Local and Global Variable Operators: Arithmetic, Logical, Relational, Conditional and Bitwise and Ternary operators, Precedence and associatively of operators, Types conversion in expression, understanding c program writing its compilation and execution | Lecturing | 6 |
| Unit - 2 | Basic input/output and library functions Single Character Input/Output i.e. getch(),getchar(), getche(), putchar(), Formatted input/output i.e. printf() and scanf(), Library Functions – concepts mathematical and character, functions. Control structures- If Statement, If..... Else Statement, Nesting of If .....Else Statement, Else If Ladder, user of ? : Operator, Switch statement | Lecturing experiments | 6 |
| Unit -3 | Compound Statement and Loop Controls – For, While, Do-While Loops, Break Continue, Exit, Goto Statement, Arrays-Single and Multidimensional and character Arrays, Array Declaration and Initialization, String: Declaration, Initialization, String handling Functions | Lecturing experiments | 6 |
| Unit-4 | Modular Programming: The Need of a Function, User Defined and Library Function, Prototype of a Function, Calling of a function, Function Argument, Passing arguments to function, Return Values, Array as function arguments , Nesting of Function, main() Parameter passing – call by value, call by reference; Recursion, Structure and union: Defining Structure, Structure – basic, membership operator, Declaration Of Structure members and Variable, Accessing Structure Members, Structure Assignment. Defining Union, basics of union,difference between structure and union. | Lecturing experiments | 6 |
| Unit -5 | Pointers: - understanding c pointers, & and * operators, pointer expression, double Pointer, Pointer Arithmetic, Pointer to array, Pointer to Function, pointer as function argument, pointer to structure. Dynamic Memory Allocation in C-Memory management functions in c: malloc(),calloc(),realloc(),free() | Lecturing experiments | 6 |

## List of Experiment

| S.No. | Unit | Experiments | Level Of Difficulty | CO |
|---|---|---|---|---|
| 1. | I | Write a program to print your name , education and address . | **B** | **CO**1 |
| 2. | I | Write a program to declare and initialize variables of different data types, initialize and display values. | **B** | **CO1** |
| 3. | I | Write a program to declare local and global variables and display their values. | **B** | **CO1** |
| 4. | I | Write a Program to perform basic arithmetic operations without user input. | **B** | **CO1** |
| 5. | I | Write a program to check whether a person can vote or not using ternary operator | **M** | **CO1** |
| 6. | I | Write a program to take input from the user of five numbers and calculate sum and average. | **M** | **CO1** |
| 7. | I | Write a program to take input from the user to perform basic arithmetic operations**.** | **M** | **CO1** |
| 8. | I | Write a program to compute area of rectangle sides are entered by the user. | **M** | **CO1** |
| 9. | I | Write a program to calculate square & cube of a number entered by the user | **M** | **CO1** |
| 10. | I | Write Program to calculate simple interest and take input of principle rate and time from the user | **E** | **CO1** |
| 11. | I | Write a program to take input of product_id and calculate cost of product where rate and quantity are supplied by the user . Print the cost of the product along with the product id. | **E** | **CO1** |
| 12. | I | Write a program to calculate area and circumference of circle based on the inputs provided by the user. | **E** | **CO1** |
| 13. | I | Write a program to take input of character using single character functions (getch(), getchar(), getche()) and display using single character output functions (putch() and putchar()) | **B** | **CO1** |
| 14. | II | Write a program to check whether entered number is positive or negative , zero | **B** | **CO1, CO3** |
| 15. | II | Write a program to print ASCII value of character entered by the user. | **B** | **CO1, CO3** |
| 16. | II | Write a program to check whether entered number is even or odd | **B** | **CO1, CO3** |
| 17. | II | Write a program to find out biggest among two or three numbers. | **B** | **CO1, CO3** |
| 18. | II | Write a program to check whether entered year is leap year or not? | **B** | **CO1, CO3** |
| 19. | II | Write a program to print result of students as I II III divisions and fail based on the marks entered by the | **E** | **CO1, CO3** |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | E.Balagurusamy Programming using ANSIC TataMcGraw-HillPublishing |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 2 | 3 | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 1 | - | - | - | - | - | - | 1 | - | - |
| CO3 | 2 | - | 1 | - | - | 2 | - | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | 2 | 1 | - | 2 | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO5 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| CO6 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | General English |
| **Course Code** | BCA-105[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 2 | 4 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Language Proficiency ,reading and writing skills | | | **Co-Requisite/s** | Basic Computer Skills: In today's digital age, many general English courses require basic computer skills, such as word processing, internet research, and email communication. Access to Learning Resources: Some courses may require access to specific learning resources, such as textbooks, online platforms, or library materials. Participation in Language Labs or Workshops: Certain English courses may have corequisites that involve attending language labs, conversation practice sessions, or writing workshops to supplement classroom learning. Language Proficiency Test Scores: While not always a strict corequisite, some institutions may recommend or require students to have achieved certain scores on English language proficiency tests (e.g., TOEFL, IELTS) to ensure they can keep up with the course material. Commitment to Attendance and Participation: Many English courses emphasize active participation in class discussions, group activities, and presentations. Therefore, a corequisite may involve a commitment to regular attendance and engagement in course activities. Prerequisite English Courses: While not strictly corequisites, some courses may recommend or require completion of prerequisite English courses to ensure students have a foundational understanding before progressing to more advanced material. Language Learning Strategies or Study Skills Workshops: Corequisites may include workshops or modules focused on language learning strategies, study skills, or time management techniques to help students succeed in their English studies. Language Exchange or Immersion Programs: In some cases, institutions may encourage or require participation in language exchange programs or immersion experiences to complement classroom learning and enhance language proficiency. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Comprehend and summarize characteristics & various structural principles prerequisite to Technical Communication**(BL1-Remember)**<br>**CO2-** Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct.**(BL2-Understand)**<br>**CO3-** Create cohesive technical paragraphs & text.**(BL3-Apply)**<br>**CO4-** Paraphrase text(s) and use appropriate referencing styles.**(BL4-Analyze)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Communication Definition, Process, Principles and Types Forms & Grapevine Barriers & Noise | Whiteboard, PPT | 12 |
| 2 | Language Know-how Common Errors Learning through examples Functional Grammar & Contemporary usage | Whiteboard, Quiz, English Lab | 12 |
| 3 | Paragraph Development Techniques Principles & Methods Instruments for Cohesive Writing Creating Mind Maps/Infographic | Whiteboard, Assignments, English Language Labs | 12 |
| 4 | Writing skills Introduction to writing skills. Tone, Orientation, Attitude, Formal vs Informal, general writing, technical writing Letter/ Application/e-mail, Format, and content Indianisms in Email Writing □ Writing for the Web: Do's & Don'ts of Email Writing, □ Netiquette | Whiteboard, Assignments, English Language Labs | 14 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| lab | group discussion ,role play, jam, e-mail writing | PBL | BL6-Create | 2 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Prasad, V., "Advanced Communication Skills", Atma Ram Publications, New Delhi. □ Madhukar, R., K, "Business Communication", Vikas Publishing House Pvt. Ltd. □ Cloud Computing-2014 written by authors of Indian English □ Lesikar, (2009), Business Communication: Making Connections in a Digital World, McGraw Hill Education. |
| **Articles** | Communication is one of the important tools that aid us to connect with people. Either you are a student or a working professional, good communication is something that will connect you far ahead. Proper communication can help you to solve a number of issues and resolve problems. This is the reason that one must know how to communicate well. The skills of communication essential to be developed so that you are able to interact with people. And able to share your thoughts and reach out to them. All this needs the correct guidance and self-analysis as well. essay on importance of communication Meaning of Communication The word communication is basically a process of interaction with the people and their environment. Through such type of interactions, two or more individuals influence the ideas, beliefs, and attitudes of each other. Such interactions happen through the exchange of information through words, gestures, signs, symbols, and expressions. In organizations, communication is an endless process of giving and receiving information and to build social relationships. Importance of Communication Communication is not merely essential but the need of the hour. It allows you to get the trust of the people and at the same time carry better opportunities before you. Some important points are as follows – Help to Build Relationships No matter either you are studying or working, communication can aid you to build a relationship with the people. If you are studying you communicate with classmates and teachers to build a relationship with them. Likewise in offices and organizations too, you make relationships with the staff, your boss and other people around. Improve the Working Environment There are a number of issues which can be handled through the right and effective communication. Even planning needs communication both written as well as verbal. Hence it is essential to be good in them so as to fill in the communication gap. Foster strong team Communication helps to build a strong team environment in the office and other places. Any work which requires to be done in a team. It is only possible if the head communicates everything well and in the right direction. Find the right solutions Through communication, anyone can find solutions to even serious problems. When we talk, we get ideas from people that aid us to solve the issues. This is where communication comes into play. Powerful communication is the strength of any organization and can help it in many ways. Earns more respect If your communication skills are admirable, people will love and give you respect. If there is any problem, you will be the first person to be contacted. Thus it will increase your importance. Hence you can say that communications skills can make a big change to your reputation in society. Get the huge list of more than 500 Essay Topics and Ideas Don't Go Overboard With Your Point The conversation is about to express your thoughts. And to let the other person know what you feel. It is not mean to prove that your point is correct and the other person is wrong. Don't Overboard other With Your Point. Watch Your Words Before you say something to Watch Your Words. At times, out of anger or anxiousness, we say somethings that we must not say. Whenever you are in a professional meeting or in some formal place, where there is a necessity of communicating about your product or work then it is advised to practice the same beforehand Conclusion Communication is the greatest importance. It is important to sharing out one's thoughts and feelings to live a fuller and happier life. The more we communicate the less we suffer and the better we feel about everything around. However, it is all the more necessary to learn the art of effective communication to put across ones point well. |
| **References Books** | McGraw, S. J., (2008) Basic Managerial Skills for Al, 8th edition, Prentice H a l of India. □ Wren & Martin, (2008), English Grammar and Composition, Sultan Chand &Sons □ Pal Rajendra, Korlaha, Hi, J, S., "Essentials of Business Communication", Sultan Chand & Sons □ Rutherford, Andrea, J., "Basic Communication Skills for Technology", Pearson Education Asia |
| **MOOC Courses** | |
| **Videos** | https://www.youtube.com/watch?v=QGHBq5OEsBM |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | - |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | 3 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Office Management Tools |
| **Course Code** | BCA-107[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of Information Technology, Computer System, various peripherals, I/o devices, and storage devices.**(BL1-Remember)**<br>**CO2-** To Understand the Basic concept of operating system, working of MS PowerPoint software and working of MS PowerPoint software .**(BL2-Understand)**<br>**CO3-** To Apply concept to identify type of software, Create formula using MS Excel Tool .**(BL3-Apply)**<br>**CO4-** To Analyze Various softwares , Analyze the data by using statistical functions using MS- Excel tool and with absolute and relative cell references using MS-Excel tool**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the performance of various operating system, graphs and tables created in Microsoft Excel , equations and sample calculations .**(BL5-Evaluate)**<br>**CO6-** To Create various documents newsletters, brochures, making document using photographs, charts, presentation, documents, drawings and other graphic images.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Basic Skills In and out view of different components of computer (Hardware), booting the machine, GUI of desktop, input and output interfacing. | Lecturing | 9 |
| Unit 2 | Microsoft Word Introduction Word - Uses of Word Processor – Working with Word - Explore the use of graphics and different fonts, understand and to make use of basic features of documents, Advanced Word Processing - Managing Document Changes - Advanced Editing and Formatting - Protecting and Sharing Documents - Customizing Documents - Using Macros, Quick parts, and Content Links - Using Fields, Forms and Indexes. | Lecturing | 8 |
| Unit 3 | Excel [Spreadsheets] Introduction Spreadsheets - Uses of Spreadsheets - Anatomy of a Spreadsheet - Creating a Spreadsheet - Formatting a Spreadsheet- Explore the tools available in spreadsheets, including formulas and calculations, Inserting and working on Graphs, Using office backstage - Using basic formulas - Using functions -Formatting cells and Ranges - Formatting worksheets - Managing worksheets - Working with data and Macros - Using advanced formulas - Securing and sharing workbooks - Creating charts - Adding pictures and shapes to a worksheet. | Lecturing,Experiment | 9 |
| Unit 4 | Power Point Presentation Introduction Power point presentation (PPT) – Uses of PPT - Creating and Formatting a Presentation - Slide Show Mode, Speaker Notes, and Outline Mode - Drawing Diagrams - Tables and Charts, review each slide template - Duplicate, move and import slides - Insert pictures and video clips - manage add-ins and security options - Create handouts - Create and apply master slides - Manage proofing options - manage language options - Use “Presenter Tools”- Connect to the projection system. | Lecturing,Experiment | 9 |
| Unit 5 | Use of Excel for Statistical Analysis Data Classification and Presentation - Cumulative Frequency Distribution - Bivariate Frequency Distributions - Tabulation of Data - Graphical Representation - Other Forms of Representation Measures of Location and Dispersion - The Arithmetic Mean – The Median – The Mode – Geometric and Harmonic Mean – Other methods of Location: Quartiles, Deciles and Percentiles – Measures of Variations or Dispersion – The Variance and Standard Deviation. Correlation - Scatter diagram – correlation coefficient Overview of Microsoft Access Databases – Design and Create Tables to Store Data – Simplify Data Entry with Forms - Obtain Valuable Information Using Queries - Create Professional Quality Output with Reports – Design and Implement Powerful Relational Databases - Build User Friendly Database Systems. | Lecturing,Experiment | 10 |

Part C

1. Explain the various MS DOS Commands.
2. Explain the components of computer system with diagram.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Alexander, M., & Kusleika, R. (2015b). Access 2016 Bible. John Wiley & Sons.<br>Berk, K. N. (2006b). Data Analysis with Microsoft Excel. |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 | 1 |
| CO2 | 2 | 3 | - | - | 2 | - | - | - | - | 1 | - | 1 | - | 2 | 1 |
| CO3 | 2 | 2 | 3 | 1 | 3 | - | - | - | - | - | 1 | 2 | 2 | - | 3 |
| CO4 | 2 | 3 | 2 | 3 | 3 | - | - | - | - | 2 | - | 2 | - | 1 | 2 |
| CO5 | 2 | 3 | 2 | 3 | 3 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 |
| CO6 | 2 | 2 | 3 | 2 | 3 | - | - | - | - | 3 | 2 | 3 | 3 | - | 1 |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Data Structure |
| **Course Code** | BCA-201(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understanding: comprehensive knowledge of the data structures;**(BL1-Remember)**<br>**CO2-** Applying: understand the importance of data and be able to identify the data requirements for an application;**(BL2-Understand)**<br>**CO3-** Analyzing: have a practical experience of algorithmic design and implementation;**(BL3-Apply)**<br>**CO4-** Evaluating: practical experience of developing applications that utilize data structures and evaluating the performances of applications;**(BL4-Analyze)**<br>**CO5-** Creating: develop projects requiring the implementation of various data structures**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Overview of Data Structure: Definition, types, various operations and applications (T1,T3,T10) , Arrays (T1,T4,T7): Linear Array, Operations on Linear Array, Multidimensional Array, Sparse Matrices; Strings . | LECTURE | 10 |
| 2 | Stack: contiguous implementation of stack, various operations on stack, Applications of stack: Infix, postfix and prefix conversions Queue: Linear queue, various operations on queue, its drawback; circular queue | EXPERT LECTURE | 10 |
| 3 | General List: Singly linked list-operations on it; doubly linked list, circular linked list. | ROLE PLAY | 10 |
| 4 | Searching: sequential search, binary search, Sorting(: Bubble sort, selection sort, insertion sort, merge sort, Quick Sort | GROUP DISCUSSION | 10 |
| 5 | Trees: Definitions: height, depth, order, degree, parent and child relationship etc; Binary tree- complete binary tree, almost complete binary tree Graph(: Related Definitions: graph representations | LECTURE | 5 |

Part C

# PBL ON DATA STRUCTURE

## Library Management System

- **Data Structures:** Linked Lists, Stacks, Queues, Trees (e.g., AVL Trees for indexing).
- **Project Overview:** Design and implement a system to manage book borrowing, returning, and inventory.
- **Tasks:**
- Implement a linked list to manage the catalog of books.
- Use stacks to handle book borrowing and returning history.
- Implement queues for managing waitlists for popular books.
- Use a tree structure for efficient search and categorization of books.

## 2. Social Network Analysis

- **Data Structures:** Graphs, Hash Tables.
- **Project Overview:** Analyze and model a social network to find connections, influencers, and communities.
- **Tasks:**
- Represent the network using an adjacency list or adjacency matrix.
- Implement algorithms to find the shortest path between users (e.g., Dijkstra's or BFS).
- Use hash tables to efficiently manage user data.
- Detect communities within the network using clustering algorithms.

## 3. E-commerce Recommendation System

- **Data Structures:** Hash Tables, Graphs, Trees (e.g., B-Trees for indexing).

- **Tasks:**
- Use linked lists to manage the sequence of messages.
- Implement Trie structures to allow fast search through the message history.
- Implement user management using hash tables.

## 9. Online Auction System

- **Data Structures:** Hash Maps, Heaps.
- **Project Overview:** Create an online platform for auctions with features like bidding and item management.
- **Tasks:**
- Use hash maps to manage auction items and user details.
- Implement heaps to manage bids and determine the highest bid efficiently.
- Develop real-time auction updates.

## 10. Hospital Management System

- **Data Structures:** Linked Lists, Queues, Trees.
- **Project Overview:** Design a system to manage patient records, doctor appointments, and hospital resources.
- **Tasks:**
- Use linked lists to maintain patient records.
- Implement queues to manage patient appointments.
- Use trees to classify and search medical records efficiently.

- Implement hash maps for efficient storage and retrieval of

movie details.

- Design and implement user review and rating systems.

## 6. Memory Management Simulator

- **Data Structures:** Linked Lists, Arrays.
- **Project Overview:** Simulate memory allocation and deallocation in an operating system.
- **Tasks:**
  - Use linked lists to simulate free and allocated memory blocks.
  - Implement algorithms for memory allocation (e.g., first fit, best fit).
  - Simulate fragmentation and defragmentation processes.

## 7. Flight Reservation System

- **Data Structures:** Graphs, Heaps.
- **Project Overview:** Build a system to manage flight reservations, cancellations, and route optimization.
- **Tasks:**
  - Represent flight routes using graphs.
  - Implement shortest path algorithms to find optimal routes.
  - Use heaps to manage reservation priority queues.

## 8. Chat Application with Searchable Message History

- **Data Structures:** Linked Lists, Trees (e.g., Trie for searching).
- **Project Overview:** Develop a chat application with searchable message history and user management.

- **Project Overview:** Build a system to recommend products based on user behavior and product similarity.
- **Tasks:**

- Use hash tables to store user preferences and product details.
- Implement collaborative filtering algorithms using graphs to find similar users.
- Use tree structures to organize and search products efficiently.

## 4. Real-Time Traffic Navigation System

- **Data Structures:** Graphs (for representing road networks), Priority Queues (for Dijkstra's algorithm).
- **Project Overview:** Develop a system that provides real-time navigation and traffic updates.
- **Tasks:**
  - Represent the road network as a graph with weighted edges.
  - Implement Dijkstra’s algorithm to find the shortest path.
  - Use priority queues to efficiently manage the nodes during pathfinding.
  - Integrate real-time data to update traffic conditions.

## 5. Movie Database System

- **Data Structures:** Trees (e.g., AVL Trees, Red-Black Trees), Hash Maps.
- **Project Overview:** Create a searchable movie database with features like movie ratings, reviews, and genre classification.
- **Tasks:**
  - Use trees to index movies for quick search by title, genre, or rating.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Lipschutz, S. (1986, January 1). Schaum's Outline of Theory and Problems of Data Structures. McGraw-Hill Companies. |
| **Articles** | |
| **References Books** | S. (1995, January 1). Fundamentals Of Data Structures In C++. Galgotia Publications. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO2 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 1 |
| CO3 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO4 | 3 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO5 | 2 | 1 | - | - | - | - | - | - | 2 | - | - | 2 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BCA**

| | |
|---|---|
| **Title of the Course** | Data Base Management System |
| **Course Code** | BCA-302(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Student should be aware of the functioning of Application software and how information technology helps in providing information by processing Data. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Relational database management system, database modeling, normalization, transaction management, SQL queries and PLSQL operation**(BL1-Remember)**<br>**CO2-** Understand the need of DBMS and basic concepts of DBMS, various models and techniques of designing DBMS , Database languages (Knowledge, Understand)**(BL2-Understand)**<br>**CO3-** Apply: Apply the principles of designing DBMS and apply it to design data bases for real time applications. (Apply).**(BL3-Apply)**<br>**CO4-** Analyze: Analyze the quality of database using normalization techniques, conflict scenarios using concurrent processing techniques, analyze various transaction serialization scenario (Analyze)**(BL4-Analyze)**<br>**CO5-** Evaluating: Evaluation of the performance of a database created for deadlocks and concurrency control. (Investigate).**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| UNIT 1 | Introduction: Database system concepts, Traditional File Oriented Approach, Database management system, advantages and disadvantages of DBMS, Views of data, Three level Architecture of DBMS, Database languages: DDL, DML, data dictionary, Data base administrator, Database Users, Data Base Models: Relational, Hierarchical and Network Model their advantages and disadvantages. | Lectures with whiteboard/PPT, Recorded video/interactive videos. Quiz. | 10 |
| UNIT 2 | E-R Model: Basic Concepts, Design Issues, Entities & Entity set, Relationship & Relationship set, Attributes, Mapping Constraints, Keys, Entity-Relationship diagram (E-R diagram), Strong & weak entities, Generalization, Specialization, Aggregation, Reducing ER diagram to tables. | EXPERT LECTURE | 10 |
| UNIT 3 | UNIT-III Overall Structure of relational DBMS. Integrity rules: Entity integrity, Referential integrity rule. Keys in DBMS: primary key, Candidate key, alternate key. Functional Dependencies, Update anomalies. Normalization: First, Second, Third & BCNF Normal Forms. | ROLE PLAY | 5 |
| UNIT 4 | UNIT- IV Relational Algebra: Selection, Projection, Different types of joins i.e. equi join, natural join, outer join, set operations. Definition of union, set difference, Cartesian product, intersection, Introduction to RDBMS, advantages and disadvantages of RDBMS. SQL: Background, Basic Structure, Data definition, Data manipulation statements, views, SET operations, Aggregate functions. | GROUP DISCUSSION | 10 |
| UNIT 5 | 5 UNIT-V Transaction concept, Transaction states, committed and uncommitted transactions, Implementations of Atomicity and durability, Serializability, Recoverability, Concurrency control in transaction.. | LECTURE | 10 |

Part C

## F. List of Practical

| S.NO. | Practical List |
|---|---|
| 1. | Creating new tables or from existing tables under specific conditions with data types supported by general DBMS tools and Oracle. |
| 2. | Altering the structure of an existing table. |
| 3. | Adding constraints to table row wise and column wise along with adding constraints after table creation using ALTER + MODIFY |
| 4. | Inserting data with multiple options. |
| 5. | Updating and deleting specific record sets |
| 6. | Using Single, multiple row functions and special general functions. |
| 7. | Aggregating data using group functions. |
| 8. | Advance SQL queries and functions, Date Time functions |
| 9. | Creating user and roles with specific privileges, controlling user access by granting permission on specific data set. |
| 10. | Applying pattern matching using LIKE and regular expression to generate a report with specific requirements. |
| 11. | Creating Join and types of Join s |
| 12. | Creating Subqueries and evaluating performance of Joins and subquery for same problem set. |
| 13. | Creating Views and comparing it with tables, specific conditions for creating normal and complex view |
| 14. | Creating and applying synonyms and sequences. |
| 15. | PL/SQL: Declaring Variable as built in anchored and defined variable, record or row variable. |
| 16. | Writing Executable Statements using anonymous block code, control structure. |
| 17. | Implementing Types of Loops in PLSQL |
| 18. | Creating and understanding PLSQL code block structure. |
| 19. | Implementing SQL query in PLSQL block, using INTO clause and handling query returning more than one row. |
| 20. | Checking Scope rules on how variable life and scope are designed. |
| 21. | Accessing results of implicit Cursor using Cursor attributes. |
| 22. | Creating Explicit cursor and different types of it like Cursor For loop, param cursor. |
| | Implementing predefine non predefine oracle provide Exception Handling in PLSQL |

| | |
|---|---|
| 23. | Implementing predefine and predefine oracle provide Exception Handling in PLSQL code. |
| 24. | Implementing User defined and Raise application error procedure |
| 25. | Creating database triggers in PLSQL as row and statement triggers. |
| 26. | Creating instead of Cascading, mutating trigger. |
| 27. | Applying LOGON and LOGOFF trigger |
| 28. | Creating Procedure in PLSQL and executing it under different circumstances like SQL command prompt and calling it inside different block. |
| 29. | Creating Functions IN and OUT variables in PSQL. |
| 30. | Creating PSQL Packages using functions and procedure to achieve the specific objectives. |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Silberschatz, A., Korth, H. F., & Sudarshan, S. (2006, January 1). Database System Concepts. |
| **Articles** | |
| **References Books** | Elmasri, R., & Navathe, S. (1994, January 1). Fundamentals of Database Systems. Addison Wesley Publishing Company. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | | | | 2 | | | | | 2 | | - | 1 | - | 1 |
| CO2 | 3 | 3 | 1 | 2 | 2 | - | - | - | - | 3 | - | - | 2 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BCA**

| | |
|---|---|
| **Title of the Course** | Java Programming |
| **Course Code** | BCA-303(T) |

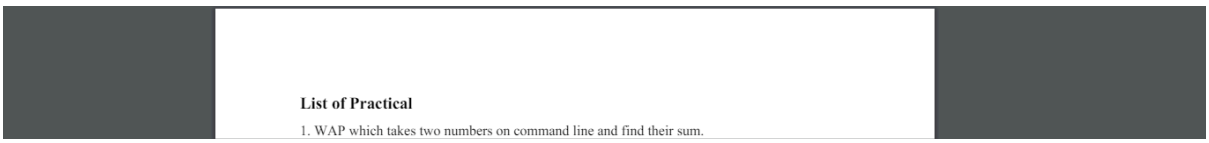
Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | basic knowledge of any one programming language such as C/C++ | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax rules of java programming**(BL1-Remember)**<br>**CO2-** To understand various Object-Oriented Concepts, Exception handling, Multithreading, networking and database connectivity techniques**(BL2-Understand)**<br>**CO3-** To implement java AWT and Swing and for GUI Programming and Event handling, java IO for Input and output handling, jdbc for database connectivity**(BL3-Apply)**<br>**CO4-** To analyze various Error ,and Database Handling techniques to learn how to improve the performance of the java application**(BL4-Analyze)**<br>**CO5-** To evaluate and compare various application Development techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of java Introduction to JAVA History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; JVM and JRE;A simple program, its compilation and execution; the concept of path and class path: Java Basics: Data types; Operators- precedence and associatively; Type conversion; decision making controls – if, if ..else, switch; loops – for, while, do…while; advanced for loop. Special statements–return, break, continue, Modular programming: methods and method overloading, memory allocation and garbage collection, static keyword | Lectures with whiteboard/PPT, Recorded video/interactive videos | 15 |
| 2 | Object Oriented Programming in Java: Class fundamentals, java Packages, Access specifies, Constructors; Copy constructor; this pointer; finalize () method, array and String, mutable and immutable; String Buffer and String Builder; Java Inheritance: Inheritance basics, method overriding and final keyword, polymorphism, static and dynamic polymorphism Abstract Class & Interfaces: abstract classes, uses of abstract classes, implementation of abstract class, defining an interface, implementing & applying interfaces, extending interfaces | Lectures with whiteboard/PPT, Recorded video/interactive videos | 10 |
| 3 | Exception Handling; understanding Exception and its classes; class hierarchy for Throwable, call stack mechanism, checked and unchecked Exception. Try, catch and finally block, throw and throws claus Multithreading: Basic idea of a Thread, differences between process and Thread, multithreaded programming; different states of a Active thread, The lifecycle of a thread; Creating thread with the thread class and runnable interface, thread constructor and thread methods; Thread synchronization; Thread scheduling; Producer consumer relationship; Daemon thread, Selfish threads, interthread communication. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 9 |
| 4 | Java AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, menu and Choice menu, Text area, Frame; Layout managers Java Applets: Introduction of java Applet, Life cycle of applet; HTML Tags for applet. Java Event Handling Model: Java's event delegation model event source, Event listeners: ActionListener, MouseListener, KeyListener | Lectures with whiteboard/PPT, Recorded video/interactive videos | 7 |
| 5 | Collection Framework: Introduction to collections framework, collection interfaces, collection classes JAVA Database Connectivity (JDBC): JDBC Drivers, Connection Interface, Result set types of Result Set, applying insert, delete, display and update operation | Lectures with whiteboard/PPT, Recorded video/interactive videos | 4 |

Part C




Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Naughton & Schildt The Complete Reference Java 2 Tata McGraw Hill |
| **Articles** | |
| **References Books** | Horstmann & Cornell "Core Java 2" (Vol I & II ) Sun Microsystems |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| CO2 | 2 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | 3 | - | 3 |
| CO3 | 1 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Soft Skills |
| **Course Code** | BCA-306 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 0 | 2 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Skill Enhancement Courses | | | | | | | |
| **Pre-Requisite/s** | 1.Basic Language Proficiency 2.Educational Background 3.Motivation and Willingness to Learn Time Commitment 4.Technology Proficiency | | | **Co-Requisite/s** | 1.Communication Skills Workshop 2.Emotional Intelligence Training 3.Conflict Resolution Seminar 4.Leadership Development Program 5.Cross-Cultural Competency Training 6.Career Development Workshops | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1- Determine interpersonal skills and be an effective goal-oriented team player. **(BL1-Remember)**<br>**CO2-** CO2- Elaborate creativity and lateral thinking.**(BL2-Understand)**<br>**CO3-** CO3- Examine attitudes, emotional intelligence and understand its influence on behavior.**(BL3-Apply)**<br>**CO4-** CO4- Justify approaches to conflict resolution**(BL4-Analyze)**<br>**CO5-** CO5- Evaluate goal setting, management, decision-making skills.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Module 1 | Self Analysis - SWOT Analysis, who am I,Attributes, Importance of Self Confidence,Self Esteem. Interpersonal Skills - Gratitude Understanding the relationship betweenLeadership Networking & Teamwork.Assessing Interpersonal Skills Situation description of Interpersonal SkillTeamwork:Necessity of Team Work Personally, Socially and Educationally | Classroom Lecture, PPts, | 10 |
| Module 2 | Creativity - Out of box thinking, Lateral Thinking.Leadership - Skills for a Good Leader, Assessment of Leadership Skills | Audio/Video clips, group discussion, lecture with ppt, Review AnalysisAudio Video Mode | 6 |
| Module 3 | Attitude- Factors influencing Attitude,Challenges, and lessons from Attitude,Etiquette. Emotional Intelligence What isEmotional Intelligence, emotional quotientwhy Emotional Intelligence matters, Emotion Scales. Managing Emotions. | Classroom Lecture, PPts, Videoes | 6 |
| Module 4 | Motivation - Factors of motivation, Self-talk,Intrinsic & Extrinsic Motivators. ConflictResolution - Conflicts in Human Relations –Reasons Case Studies, Approaches to conflict resolution. | Mind Map | 6 |
| Module 5 | Goal Setting - Wish List, SMART Goals,Blueprint for success, Short Term, Long Term, Lifetime Goals. Time Management Value of time, Diagnosing Time Management,Weekly Planner To-do list, Prioritizing work.Extempore Decision Making - Importance and necessity of Decision Making, Process and practical way of Decision Making,Weighing Positives & Negatives. Technical Topic Presentation. | Audio/Video clips, group discussion,lecture with ppt, quizLectures, Case Studies, Experiential Learning | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998. ThomasA Harris, I am ok, You are ok, New York-Harper and Row, 1972 |
| **Articles** | https://www.frontiersin.org/articles/10.3389/feduc.2019.00087/full https://www.cii.co.uk/media/6158020/a-useful-guide-to-swot-analysis.pdf http://www.mmmut.ac.in/News_content/35141tp news_10142020.pdf |
| **References Books** | Covey Sean, Seven Habit of Highly Effective Teens, New York, Fireside Publishers, 1998. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998. Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972 Daniel Coleman, Emotional Intelligence, Bantam Book, 2006 |
| **MOOC Courses** | https://www.edx.org/learn/leadership/catalyst-leading-with-effective-communication-inclusive-leadership-training?hs_analytics_source=referrals&utm_source=mooc.org&utm_medium=referral&utm_campaign=mooc.org-course-list https://www.edx.org/learn/writing/university-of-california-berkeley-academic-and-business-writing?hs_analytics_source=referrals&utm_source=mooc.org&utm_medium=referral&utm_campaign=mooc.org-course-list |
| **Videos** | https://www.youtube.com/watch?v=fq98P9N9Hbg https://www.youtube.com/watch?v=uA5YeqgsjmYhttps://www.youtube.com/watch?v=eBSeCp__xhI |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | 3 | - | - | - | 2 | - | 3 | - | - | 3 | 2 | - |
| CO2 | 2 | 3 | - | - | - | - | - | 2 | - | - | - | - | - | 3 | - |
| CO3 | - | - | - | - | - | 1 | - | - | - | - | - | - | 2 | - | - |
| CO4 | - | 2 | - | 2 | - | - | - | 3 | - | - | - | - | - | 3 | - |
| CO5 | 3 | - | 3 | 3 | - | 3 | - | - | - | 3 | - | - | 3 | - | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Web Designing with PHP |
| **Course Code** | BCA-401(P) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 3 | 3 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various Web Development Strategies using PHP and syntax rules of web Programming**(BL1-Remember)**<br>**CO2-** To understand the basics of web architecture, Development techniques, knowledge about file system.**(BL2-Understand)**<br>**CO3-** To implement: HTML, JavaScript and Arry, strings, database connectivity to create Web applications.**(BL3-Apply)**<br>**CO4-** To analyze various Server-side programming techniques and OOPS Techniques**(BL4-Analyze)**<br>**CO5-** To evaluate and improve the performance of the web application with the help of session handling Techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG5(Gender equality)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introducing PHP – history and Basic development Concepts, PHP delimiters, creating user-defined variables, data types with PHP, type casting – Creating first PHP Scripts, declaring and using constants, Using Variable and Operators, – Storing Data in variables -Setting and Checking variables Data types, comments with php, useful readymade function of PHP. Controlling Program Flow: making decisions with if, else, and switchwriting More Complex Conditional Statements – Repeating Action with Loops and super global variables. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| 2 | Use of HTML for web design and JavaScript-, html scripts and form elements, embedding php with HTML, redirecting web pages, adding dynamic content using Java script, Working with Numeric Functions. Working with Arrays: Storing Data in Arrays – Numerically index array, associative and multi-decisional, array Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions, Array sorting, converting array to scalar variables – Working with Dates and Times | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| 3 | String Handling: formatting strings, joining and splitting a string comparing strings matching and replacing substrings, string functions, introduction of php regular expression. Exception Handling: exception handling structure, try…catch…throw Introduction to file system- file system and uses, saving program data for later use for file system, opening a file, creating and writing to a file closing a file and deletion operation on file, reading data from a file, file handling functions. Processing Directories. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| 4 | Using PHP Functions and Classes: Introduction to functions. Creating userdefined function parameters, returning values, calling by values versus calling by reference, using include () and require () functions. Creating PHP Classes – Using Advanced OOP Concept, creating a PHP class, object, methods, operations, class attributes, class method invocation, php static hinting, object cloning, inheritance, final keyword, php abstract class, and interface. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |
| 5 | Working with Database: working on MYSQL database, connection PHP with MySQL, creating database tables, implementing insert delete, update and select query using PHP script, | Lectures with whiteboard/PPT, Recorded video/interactive videos | 8 |

# PBL TOPICS

## PHP

1. **Simple CMS (Content Management System):**
- Build a basic CMS using PHP where users can create, edit, delete, and manage content (e.g., articles, blog posts).
- Include features like user authentication, role-based access control, and a WYSIWYG editor for content creation.

2. **Online Quiz System:**
- Develop an online quiz application where users can take quizzes on various topics.
- Implement features such as user registration, quiz creation, multiple-choice questions, scoring, and result display.

3. **Online Task Management System:**
- Create a task management application where users can create tasks, assign them to others, set deadlines, and track progress.
- Include features like user authentication, task categorization, priority levels, and status updates.

4. **E-commerce Website:**
- Build a simple e-commerce platform using PHP where users can browse products, add them to cart, and make purchases.
- Implement features like user registration, product catalog, shopping cart functionality, and payment integration (e.g., PayPal).

5. **OnlineStudent Information System:**
- Develop a student information system for managing student records, course details, grades, and attendance.
- Include features such as user authentication, student enrolment, course registration, and grade management.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | VIKRAM VASWANI PHP A Beginner's Guide Tata McGraw-Hill |
| **Articles** | Steven Holzner The PHP Complete Reference – Tata McGraw-Hil |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | 3 | 1 | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO2 | 2 | 2 | -3 | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO3 | 2 | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO4 | 1 | 2 | -1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO5 | 2 | 2 | 2 | 1 | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BCA**

| | |
|---|---|
| **Title of the Course** | Python Programming |
| **Course Code** | BCA-403(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 2 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic programming concept.**(BL1-Remember)**<br>**CO2-** Understand the basics of Python like python origin downloading and installing and basic concepts of python.**(BL2-Understand)**<br>**CO3-** Apply the various conditional and looping statement and functional programming.**(BL3-Apply)**<br>**CO4-** Explain various objects numbers and sequence in python Analyze the concept of regular expression**(BL4-Analyze)**<br>**CO5-** Evaluate the concept of object-oriented programming for better utilization of language**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Introduction to Python programming Introduction, origin of Python, Downloading, Installing and Running Python, Python Basics: Comment, Identifier, Indentations, Basic data types, conversions, operators, Build in functions. I/O Statements, Condition Statements & Loops: If, else, elif), conditional expressions, while, for, break continue | Lectures | 6 |
| Unit 2 | Data Structures in Python Lists: Introduction, Accessing list, Operations, Working with lists, Tuple: Introduction, Accessing tuples, Operations, Working with list, Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Set: Introduction ,Accessing set, Operations, Working with sets | Lectures | 6 |
| Unit 3 | Functions, Modules, File Handling Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous function, Global and local variables, Recursion. Modules: Creating modules, Importing module, Packages, File Handling :Opening and closing files, Reading and writing files | Experiments | 6 |
| Unit 4 | Exceptional Handling, Regular Expressions Exception Handling: Exception, Exception Handling, Try and Except clause,User Defined Exceptions, Exception handling in files). Regular Expressions: Introduction/motivation, special symbols and characters for REs , Match function, Search function., Matching VS Searching., Modifiers, Patterns. | Experiments | 6 |
| Unit -5 | Object Oriented Programming in Python Introduction, OOPS Basics: Class and object Constructors, Need of Encapsulations, Attributes, default attributes, static attributes, static methods, initializing objects, Pass by reference, self. Relational-ships: Introduction, Aggregation, Dependency. Inheritance: Need of Inheritance, Overriding, Super, Types of Inheritance. Abstract Class, methods. | PBL | 6 |

Part C

| S.NO. | Practical List |
|---|---|
| 1 | Program to count the number of each vowel in a string. |
| 2 | Program to Find Sum of Natural Numbers Using Recursion. |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Gondaliya, V. (2019, August 30). Programming With Python. Vaibhav Gondaliya. |
| **Articles** | |
| **References Books** | Hetland, M. L. (2006, November 7). Beginning Python. Apress |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | - | - | 2 | 2 | - | - | - | - | 1 | - | 1 | - | 1 |
| CO2 | 1 | 1 | - | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | 2 | 3 |
| CO3 | - | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | - | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Minor Project |
| **Course Code** | BCA-405 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | sofetware development life cycle, Project life cycle | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 : Understand the project Develpoment Life Cycle **(BL2-Understand)**<br>**CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)**<br>**CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)**<br>**CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Develop Synopsis for the proposed / chosen topic | PBL | BL2-Understand | 10 |
| 2 | Develop prototype of the ysstem proposed | PBL | BL3-Apply | 30 |
| 3 | Performa testing on the modules and the ysstme as a whole | Experiments | BL4-Analyze | 10 |
| 4 | incoporate the changes required based on testing result | PBL | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 2 | - | - | 2 | - | - | 1 | - | - | 2 | 1 | 2 |
| CO2 | - | - | - | 2 | - | - | 2 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO3 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | - | - | - | 1 | - | - | - | - | - | 2 | - | - | 1 | 1 | 3 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Data Science Using Python |
| **Course Code** | BCA-604-C(P) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 3rd | **Semester** | 6th | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic programming concept.**(BL1-Remember)**<br>**CO2-** To understand the Basic concept of Data science, application areas and tools for data science**(BL2-Understand)**<br>**CO3-** To implement Numpy for handling numerical data, pandas for handling data and basic and advanced visualization techniques to visualize the data. **(BL3-Apply)**<br>**CO4-** To analyze the different domains of data, and perform cleaning and other preprocessing tasks on the data. **(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the data using statistical & visualization tools;**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | What is Data Science, The Many Paths to Data Science, What Makes Someone a Data Scientist, Advice for New Data Scientists, Applications of Data Science, Tools and techniques for Data Science. | lecturing | 1 |
| 2 | NumPy: Creating arrays, Array Indexing: Field access, Basic Slicing, Advanced indexing, Basic operations and manipulations, Broadcasting, Applications of Broadcasting.<br>Pandas: Series, Dataframe, Reading and Writing Data from csv, text and excel file, Statistics Summarizations, Viewing Data using built in functions, Filter Data Frames based on value condition, Built in Functions for basic operations, Grouping of Data | lecturing,Experiment | 1 |
| 3 | Data Analysis Understanding the Domain, Understanding the Dataset, Python package for data science, Importing and Exporting Data in Python, Basic Insights from Datasets Cleaning and Preparing the Data: Identify and Handle Missing Values, Data Formatting, Data Normalization Sets, Binning, Indicator variables Summarizing the Data Frame: Descriptive Statistics, Basic of Grouping, ANOVA, Correlation, More on Correlation. | lecturing,Experiment | 1 |
| 4 | Introduction to Visualization Tools: Introduction to Data Visualization, Introduction to Matplotlib, Basic Plotting with Matplotlib, Line Plots, Area Plots, Histograms, Bar Charts Specialized Visualization Tools: Pie Charts, Box Plots, Scatter Plots, Bubble Plots. | lecturing,Experiment | 1 |
| 5 | Advanced Visualization Tools: Waffle Charts,Word Clouds, Seaborn and Regression Plots. Creating Maps and Visualizing Geospatial Data: Introduction to Folium, Maps with Markers, Choropleth Maps. | PBL | 1 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | VanderPlas, J. (Year of Publication). Python Data Science Handbook: Essential Tools for Working with Data. O'Reilly Media, Inc. |
| **Articles** | |
| **References Books** | McKinney, W. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython (2nd ed.). O'Reilly Media, Inc. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 1 | - | 1 | - | 1 | - | - | - | - | - | - |
| CO2 | 1 | - | 1 | - | 1 | - | - | - | - | - | - | 1 | - | 1 | - |
| CO3 | 1 | 1 | 1 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | 1 | 1 |
| CO4 | - | 1 | 1 | 1 | 1 | - | - | - | 1 | - | 1 | - | 1 | - | 1 |
| CO5 | - | 1 | - | 1 | - | 1 | 1 | 1 | 1 | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**BCA**

| | |
|---|---|
| **Title of the Course** | Computer Fundamentals and Applications |
| **Course Code** | BCA101[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 3 | 0 | 0 | 3 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | NIL | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concept of Information Technology, Computer System, various peripherals, I/o devices, and storage devices.**(BL1-Remember)**<br>**CO2-** To Understand the Basic concept of operating system, working of MS PowerPoint software and working of MS PowerPoint software .**(BL2-Understand)**<br>**CO3-** To Apply concept to identify type of software, Create formula using MS Excel Tool**(BL3-Apply)**<br>**CO4-** To Analyze Various softwares , Analyze the data by using statistical functions using MS- Excel tool and with absolute and relative cell references using MS-Excel tool**(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the performance of various operating system, graphs and tables created in Microsoft Excel , equations and sample calculations .**(BL5-Evaluate)**<br>**CO6-** To Create various documents newsletters, brochures, making document using photographs, charts, presentation, documents, drawings and other graphic images.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Basics of Computer Systems, Hardware Components, Evolution of Computers, Computer Generations, Classification of Computers, Computer Applications, Interaction between User and Computer, Basic Computer Organization, Input and Output Devices, Central Processing Unit, System Bus Architecture, Memory or Storage Unit. | Lectures with whiteboard/PPT,PBL | 10 |
| Unit-2 | Software Types: Software and its Need, Types of Software - System software, Application software, System Software, Utility Program, Operating System: DOS, Windows, Linux etc., Firmware. | Lectures with whiteboard/PPT,PBL | 9 |
| Unit-3 | Creating word documents; The word window, Entering Text. Editing Document text; Selecting Text, Copying and Moving Text. Applying Text Enhancements; Applying Fonts and Font Styles in Word, Highlighting Text For Distinctive Look. Aligning and Formatting ; Aligning Text, Using Indentation Options, Setting Line Spacing Options, Using Tabs. Creating Lists, Numbers and Symbols; Numbering and Bullets, Creating Special Characters. Replacing and checking Text; Creating and Applying Frequently Used Text, Finding and Replacing Text, More about Spelling and Grammar, Using the Thesaurus Command. Getting Into Print; Using Print Preview, Changing Page Orientation and Paper Size, Aligning Text Vertically, Setting Margins, Printing Options. | Lectures with whiteboard/PPT,PBL | 10 |
| Unit-4 | Creating a Basic Presentation, Modifying Visual Elements, Formatting and Checking Text, Adding Objects, Applying Transitions, Animation Effects and Linking, Preparing handouts, Taking the Show on the Road. | Lectures with whiteboard/PPT,PBL | 8 |
| Unit-5 | Entering and Editing Cell Entries ; The excel Application Window , Workbooks and Worksheets, Moving the Cell Pointer, Entering Text and Numbers , Revising Text and Numbers. Working with Numbers; Creating Formulas, Formatting numbers. Changing Worksheet Layout ; Adjusting Column Width and Row Height, Inserting and Deleting Rows and Columns, Inserting and Deleting Cells , Moving and Copying Cell Contents , Naming a Worksheets , Selecting Worksheets , Copying and Moving Worksheets, Inserting and Deleting Worksheets, Other Formatting Options ; Aligning Text , Border and Color. Printing in Excel; Print Preview, Changing Page Setup, Checking Worksheet Spelling | Lectures with whiteboard/PPT,PBL | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| I-V | PBL | PBL | BL3-Apply | 5 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Sinha, P.K. Fundamentals of Computers. Prentice Hall of India |
| **Articles** | |
| **References Books** | Rajaraman, V. Fundamentals of Computers. Prentice Hall of India. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO3 | - | 1 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | - |
| CO4 | - | - | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | 1 | - | 2 | 2 | - |
| CO6 | - | - | - | 1 | - | - | - | - | - | - | - | 2 | - | - | - |

# Syllabus-2023-2024

## BCA

| | |
|---|---|
| **Title of the Course** | Web Technologies |
| **Course Code** | BCA102[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 2 | 2 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | basic knowledge computer file system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various Web Development Strategies and syntax rules of web Programming**(BL1-Remember)**<br>**CO2-** To understand the basics of web architecture, Types of architecture, knowledge about web protocols and web development tools.**(BL2-Understand)**<br>**CO3-** To implement: HTML, CSS, Javascript and XML web designing language to create Web pages.**(BL3-Apply)**<br>**CO4-** To analyze various Client-side programming techniques and introduction of CSS for styling of the web page.**(BL4-Analyze)**<br>**CO5-** To evaluate the web pages and layout with the help of Advanced CSS Techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG6(Clean water and sanitation)<br>SDG7(Affordable and clean energy)<br>SDG10(Reduced inequalities)<br>SDG12(Responsible consuption and production)<br>SDG13(Climate action)<br>SDG14(Life below water)<br>SDG15(Life on land) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Prerequisite: basic knowledge computer file system. Introduction to Web Development: Web Development Strategies ,Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development. Web Essentials: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response. | Lectures | 10 |
| 2 | Web Page Designing HTML: list, table, images, forms, Basics of HTML, formatting and fonts, commenting code, color, hyperlink, list, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5 | Experiments | 10 |
| 3 | Style Sheets CSS-Introduction to Cascading Style Sheets, Features, Core Syntax, Style Sheets and HTML Style Cascading and Inheritance, Text Properties, Box Model, Normal Flow Box Layout, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3 | Experiments | 8 |
| 4 | Scripting Java script: Introduction, documents, forms, statements, functions, objects; event and event handling; Introduction to client and server side scripting,data types, operators, conditional statement, loops in Java script, functions, arrays, objects and elements in Java script, form validation using Java script., | PBL | 9 |
| 5 | Introduction to XML, uses of XML, simple XML, XML key components, DTD and | PBL | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Create a specimen of corporate web page. Divide the browser screen into two frames. The frame on the left will be a menu consisting of hyper links. Clicking on any of these link will lead to a new page, which must open in a target frame which is on right side. | Experiments | BL2-Understand | 10 |
| 2-3 | Write a java script code block, which validates a user name and password against hard coded values. If either name or password field is not entered display an error message showing “You forgot one of the required fields. Please try again” In case the field matched do not match the hard coded values, display an error message showing : “Please enter a valid user name and password” If the field entered matched , Display the following message: “Welcome (Username)”. | Experiments | BL3-Apply | 10 |
| 4-5 | Intelligent Tourist Guide: Nowadays people use mobile phones and other mobile devices. Most of us have a small computing device that is always with us. People use it example for calling, as calendar and organizer. Mobile devices with GPS receiver are also used to find paths in navigation. The main idea of this thesis was to design a system that will run on most of phones and palms and will be helpful when visiting some new places and cities. | PBL | BL5-Evaluate | 30 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Jackson, J. C. (2020). Web Technologies: A Computer Science Perspective. Prentice Hall.Science Perspective; |
| **Articles** | |
| **References Books** | Bayross, I. (2019). Web Enabled Commercial. BPB Publications. Applications Development using HTML, DHTML, JavaScript, Perl CGI |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | - | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO3 | 2 | 1 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Syllabus-2023-2024**

**MCA**

| | |
|---|---|
| **Title of the Course** | Android based Application Development |
| **Course Code** | MCA 106-B(P) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 3 | 3 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Having the exposure about the object-oriented programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax rules of the programming language such as java and XML**(BL1-Remember)**<br>**CO2-** To understand Object Oriented concepts for Android and various mobile application development concepts including interface designing, handling multiple activities**(BL2-Understand)**<br>**CO3-** To implement XML, Java and mysql for database connectivity and file system**(BL3-Apply)**<br>**CO4-** To analyze various widgets and learn to use them as per the problem**(BL4-Analyze)**<br>**CO5-** To develop solutions for real world problems using android application development**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Getting Started with Android - Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file | whiteboard/PPT, Recorded video/interactive videos | 08 |
| 2 | Android Application Design Essentials - Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions. Activity States and Life Cycle. XML : Tage, Namespaces. | whiteboard/PPT, Recorded video/interactive videos | 10 |
| 3 | Building Blocks of Mobile Apps - Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation. | whiteboard/PPT, Recorded video/interactive videos | 9 |
| 4 | Shared Preferences, Mobile Databases such as SQLite, Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources. | whiteboard/PPT, Recorded video/interactive videos | 08 |
| 5 | Using Common Android APIs: Using Android Data and Storage APIs, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World. | whiteboard/PPT, Recorded video/interactive videos | 08 |

Part C

## Project Based Learning on Andriod Based Application Development

1. Develop an application that uses components, Font and Colors.
2. Develop a native calculator application.
3. Develop an application that uses layout managers and events managers.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that creates an alert upon receiving a message
6. Develop an application that makes use of database.
7. Implement an application that implements multi-threading.
8. Develop a native application that uses GPS location information
9. Create a mobile application that creates alarm clock.
10. Create an application that makes use of Explicit and implicit intents.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Lauren Darcey and Shane Conder, Android Wireless Application Development,Pearson Education, 2nd ed. (2011) |
| **Articles** | B.M.Harwani Android Programming Unleashed Pearson Education Inc 2013 |
| **References Books** | Charlie Collins, Michael D.Galpin, Matthias Kappler,Android in Practice,DreamTech Press 2016 |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | 3 |
| CO2 | - | 2 | - | 2 | 2 | - | - | - | - | - | - | - | 2 | 1 | - |
| CO3 | - | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO4 | 1 | 2 | - | 1 | 2 | - | - | - | - | - | - | - | 2 | 3 | - |
| CO5 | - | 1 | 2 | - | - | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Programming with Python |
| **Course Code** | MCA 106-B(P) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 3 | 3 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic programming concept.**(BL1-Remember)**<br>**CO2-** Understand the basics of Python like python origin downloading and installing and basic concepts of python.**(BL2-Understand)**<br>**CO3-** Apply the various conditional and looping statement and functional programming.**(BL3-Apply)**<br>**CO4-** Explain various objects numbers and sequence in python Analyze the concept of regular expression**(BL4-Analyze)**<br>**CO5-** Evaluate the concept of object-oriented programming for better utilization of language**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✓<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit 1 | Introduction to Python programming Introduction, origin of Python, Downloading, Installing and Running Python, Python Basics: Comment, Identifier, Indentations, Basic data types, conversions, operators, Build in functions. I/O Statements, Condition Statements & Loops: If, else, elif), conditional expressions, while, for, break continue | Lectures | 6 |
| Unit 2 | Data Structures in Python, Regular Expressions Lists: Introduction, Accessing list, Operations, Working with lists, Tuple: Introduction, Accessing tuples, Operations, Working with list, Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries, Set: Introduction ,Accessing set, Operations, Working with sets Regular Expressions: Introduction/motivation, special symbols and characters for REs , Match function, Search function., Matching VS Searching., Modifiers, Patterns. | Lectures | 12 |
| Unit 3 | Functions, Modules, File Handling Functions: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous function, Global and local variables, Recursion. Modules: Creating modules, Importing module, Packages, File Handling: Opening and closing files, Reading and writing files | Lectures | 10 |
| Unit 4 | Exceptional Handling, Object Oriented Programming in Python Exception Handling: Exception, Exception Handling, Try and Except clause, User Defined Exceptions, Exception handling in files). Object Oriented Programming in Python Introduction, OOPS Basics: Class and object Constructors, Need of Encapsulations, Attributes, default attributes, static attributes, static methods, initializing objects, Pass by reference, self. Relational-ships: Introduction, Aggregation, Dependency. Inheritance: Need of Inheritance, Overriding, Super, Types of Inheritance. Abstract Class, methods. | Experiments | 15 |
| Unit -5 | (Web Programming) Introduction, Creating Simple Web Client, Advanced Web Clients, CGI, Building CGI Applications. | PBL | 20 |

| S.NO. | Practical List |
|---|---|
| 1 | Program to count the number of each vowel in a string. |
| 2 | Program to Find Sum of Natural Numbers Using Recursion. |
| 3 | Program To Display Powers of 2 Using Anonymous Function. |
| 4 | Program to Accept Three Digits and Print all Possible Combinations from the Digits. |
| 5 | Program to Find the Sum of the Series: 1 + x^2/2 + x^3/3 + … x^n/n. |
| 6 | Program to Create a List of Tuples with the First Element as the Number and Second Ele as the Square of the Number. |
| 7 | Program to Count the Frequency of Words Appearing in a String Using a Dictionary. |
| 8 | Program to Remove the Duplicate Items from a List. |
| 9 | Program that Displays which Letters are in the First String but not in the Second |
| 10 | ARS Gems Store sells different varieties of gems to its customers. Write a Python progra calculate the bill amount to be paid by a customer based on the list of gems and quantity purchased. Any purchase with a total bill amount above Rs.30000 is entitled for 5% disco If any gem required by the customer is not available in the store, then consider total bill amount to be -1. Assume that quantity required by the customer for any gem will always b greater than 0. Perform case-sensitive comparison wherever applicable.<br>Hours |
| 11 | Given a list of integer values. Write a python program to check whether it contains same number in adjacent position. Display the count of such adjacent occurrences.<br>1.0 Hours |

| Sample Input | Expected Output |
|---|---|
| [1,1,5,100,-20,-20,6,0,0] | 3 |
| [10,20,30,40,30,20] | 0 |
| [1,2,2,3,4,4,4,10] | 3 |

| | |
|---|---|
| 12 | Program to Count the Occurrences of a Word in a Text File. |
| 13 | Program to Read a File and Capitalize the First Letter of Every Word in the File. |
| 14 | Program to Create a Class which Performs Basic Calculator Operations |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Wesley J. Chun;; Core Python Programming Prentice Hall. |
| **Articles** | |
| **References Books** | Megnus Lie Hetland Beginning Python from Novice to Professional Apress. Mark Lutz Programming Python rd 2 Edition, O'Reilly Media, Inc Dusty Philips Python 3 Object Oriented Programming Packt Publishing; July 2019 Steve Holden and David Beazley Python Web Programming New Riders |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | 2 | 3 |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Software Engineering |
| **Course Code** | MCA 204 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | student must have knowledge about basic data structures , computer organization & programming language concepts. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basics of software engineering **(BL1-Remember)**<br>**CO2-** Tounderstandthe basics characterstics&crisis of software and process of software engineering systems**(BL2-Understand)**<br>**CO3-** To implement various SDLC, ER, DFD models, to collect SRS, And understand the software.**(BL3-Apply)**<br>**CO4-** ToAnalyze various various testing techniquesand the concept of testing strategies**(BL4-Analyze)**<br>**CO5-** Toevaluatethe the need of Software Maintenance and Software Project Management Software, Need for Maintenance , Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering and other inter process communication tech An Overview of CASE Tools, Constructive Cost Models (COCOMO), Software Risk Analysis and Management .**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit-1 | The software as product and a process, What is software engineering?Software DevelopmentLifeCycle,RequirementsAnalysis,SoftwareDesign, Coding,Testing,Maintenanceetc. | Lecturing | 8 |
| Unit-2 | Thesoftwarerequirementsdocumentation,Systemcontext,Require mentsDefinition&Evolution. Software Requirement Specification, Waterfall Model, Prototyping Model, IterativeEnhancementModel,Spiral Model, Role ofManagement inSoftware Development, Role ofMetrics and Measurement, Problem Analysis, Requirement Specification, Validation, Metrics,Monitoringand Control | Lecturing | 8 |
| Unit-3 | System Design principles, software design concepts: Functional v/s Object-Oriented Approach,Coding,Top-down&Bottom- up,StructuredProgramming,InformationHiding. Testing: Testing fundamentals, Levels of Testing, Test Plan, Test Cases Specification, Black boxand whiteboxtesting | Case Study | 8 |
| Unit-4 | Themanagementactivities– Configuration management,Versioning,Software management stru ctures,programmerproductivity.SoftwareProjectManagement ,Cos tEstimation,ProjectScheduling,Staffing,SoftwareConfigurationM anagement,QualityAssurance,ProjectMonitoring,Risk Management. | case study | 8 |
| Unit-5 | Process quality assurance, quality reviews, Software reliability, ISO standards, SQA plan. CaseTools. | case Study | 8 |

Part C

## Case Study
## Software Engineering

1. Analysing the challenges and solutions for software maintenance: Students are required to identify the challenges appeared during software maintenance using various types of information gathering tools and must propose a systematic and feasible maintenance plan with output showing growth with respect to following points
    - User Satisfaction level
    - Software periodic update
    - Software Licence renewable
    - Software upgradability.

2. Perform automated testing and design customized test cases on any project modules. Also report the bugs encountered during testing phase and compute time incurred in rectifying bugs during testing phase. Compare the time involved in rectifying bugs at development phase and at testing phase.
3. You are required to build a Inventory management system for a departmental store, Prepare a logical design as well as use case and system flowcharts for the same.

4. You are required to build a Student information system for a departmental of school of Engineering, Prepare a logical design as well as use case and system flowcharts for the same.
5. 
6. Compute the following using any project/modules of your choice
    - Product Metrics
    - Process Metrics
    - Project Metrics
7. Prepare a complete SRS report of a software that is not in existence as well as software that is already is being used but needs to be updated.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Pressman, R. S., & Dr, B. R. M. (2014, January 23). Software Engineering: A Practitioner's Approach. McGraw-Hill Education. |
| **Articles** | |
| **References Books** | Mall, R. (2018, September 1). FUNDAMENTALS OF SOFTWARE ENGINEERING, FIFTH EDITION. PHI Learning Pvt. Ltd. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | 2 |
| CO2 | 1 | - | - | - | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 3 |
| CO3 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 3 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Data Science with Python |
| **Course Code** | MCA 205 (A) (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the basic programming concept.**(BL1-Remember)**<br>**CO2-** To understand the Basic concept of Data science, application areas and tools for data science**(BL2-Understand)**<br>**CO3-** To implement Numpy for handling numerical data, pandas for handling data and basic and advanced visualization techniques to visualize the data. **(BL3-Apply)**<br>**CO4-** To analyze the different domains of data, and perform cleaning and other preprocessing tasks on the data. **(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the data using statistical & visualization tools;**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | What is Data Science, The Many Paths to Data Science, What Makes Someone a Data Scientist, Advice for New Data Scientists, Applications of Data Science, Tools and techniques for Data Science. | lecturing | 1 |
| 2 | NumPy: Creating arrays, Array Indexing: Field access, Basic Slicing, Advanced indexing, Basic operations and manipulations, Broadcasting, Applications of Broadcasting.<br>Pandas: Series, Dataframe, Reading and Writing Data from csv, text and excel file, Statistics Summarizations, Viewing Data using built in functions, Filter Data Frames based on value condition, Built in Functions for basic operations, Grouping of Data | lecturing,Experiment | 1 |
| 3 | Data Analysis Understanding the Domain, Understanding the Dataset, Python package for data science, Importing and Exporting Data in Python, Basic Insights from Datasets Cleaning and Preparing the Data: Identify and Handle Missing Values, Data Formatting, Data Normalization Sets, Binning, Indicator variables Summarizing the Data Frame: Descriptive Statistics, Basic of Grouping, ANOVA, Correlation, More on Correlation. | lecturing,Experiment | 1 |
| 4 | Introduction to Visualization Tools: Introduction to Data Visualization, Introduction to Matplotlib, Basic Plotting with Matplotlib, Line Plots, Area Plots, Histograms, Bar Charts Specialized Visualization Tools: Pie Charts, Box Plots, Scatter Plots, Bubble Plots. | lecturing,Experiment | 1 |
| 5 | Advanced Visualization Tools: Waffle Charts,Word Clouds, Seaborn and Regression Plots. Creating Maps and Visualizing Geospatial Data: Introduction to Folium, Maps with Markers, Choropleth Maps. | PBL | 1 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | VanderPlas, J. (Year of Publication). Python Data Science Handbook: Essential Tools for Working with Data. O'Reilly Media, Inc. |
| **Articles** | |
| **References Books** | McKinney, W. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython (2nd ed.). O'Reilly Media, Inc. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | - | - | 2 | - | - | -- | - | - | - | 2 | 1 | 2 | 1 |
| CO2 | 3 | 3 | - | - | 2 | 2 | 1 | 1 | - | 2 | - | 2 | 2 | 1 | 3 |
| CO3 | 3 | 3 | 3 | 2 | 3 | 1 | 1 | - | 2 | 2 | 1 | 2 | 1 | 2 | 2 |
| CO4 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | - | 2 | 3 | 2 | 3 | 2 | 1 | 3 |
| CO5 | 3 | 3 | 2 | 3 | 3 | 1 | 2 | - | 2 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Big Data |
| **Course Code** | MCA 205- C(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic programming is needed to manipulate your data, and java is the base language to start with | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To understand the fundamentals of Big Data.**(BL2-Understand)**<br>**CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)**<br>**CO3-** CO3: To explore tools and practices for big data and Visualization. **(BL3-Apply)**<br>**CO4-** CO4: To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)**<br>**CO5-** CO5: To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)**<br>**CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Big Data: Fundamentals of Big Data, defining big data, building successful big data management architecture, big data journey Big Data Types: Structured and unstructured data types, real time and non-real time requirements. Distributed Computing: History of distributed computing, basics of distributed computing | Lectures with whiteboard/PPT, Recorded video | 6 |
| Unit-2 | Big Data Technology Foundation: Big Data stack, redundant physical infrastructure, security infrastructure, operational databases, organising data services and tools, analytical data warehouse, big data analytics Virtualization: Basics of virtualization, hypervisor, abstraction and virtualization, implementing virtualization with big data Cloud and Big Data: Defining cloud, cloud deployment and delivery models, cloud as an imperative for big data, use the cloud for big data | Lectures with whiteboard/PPT, Recorded video | 10 |
| Unit-3 | Visualization: data visualization, appropriate data visualization technique for given data, design visualizations, dashboard Operational Databases: Relational database, nonrelational database, key-value pair databases, document databases, columnar databases, graph databases, spatial databases MapReduce Fundamentals: Origin of MapReduce, map function, reduce function, putting map and reduce together, optimizing map reduce. | Lectures with whiteboard/PPT, Recorded video | 15 |
| Unit-4 | Hadoop: Discovering Hadoop, Hadoop distributed file system, Hadoop MapReduce, Hadoop file system, dataflow, Hadoop I/O, data integrity, compression, serialization, file-based data structure | Lectures with whiteboard/PPT, Recorded video | 9 |
| Unit-5 | Introduction to Hadoop Ecosystem: Avro - Avro data types and schemas, in-memory serialization and deserialization, avro datafiles, schema resolution Pig-Comparison with databases, pig latin, user defined functions, data processing operators Hive-Running hive, comparison with traditional databases, HiveQL, tables, querying data, user defined functions | Lectures with whiteboard/PPT, Recorded video | 5 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-3 | Assignment | Experiments | BL3-Apply | 2 |
| 1-4 | Quiz | Experiments | BL3-Apply | 1 |
| 1-5 | Practical Assignment | Experiments | BL3-Apply | 25 |
| 1-5 | PBL | PBL | BL6-Create | 35 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Services, E. E. (2015, January 5). Data Science and Big Data Analytics. |
| **Articles** | Research on Big Data – A systematic mapping study:https://www.sciencedirect.com/science/article/abs/pii/S0920548917300211 |
| **References Books** | Holmes, J. (2014, January 10). John Bowlby and Attachment Theory. |
| **MOOC Courses** | |
| **Videos** | Introduction to big data : https://archive.nptel.ac.in/courses/106/104/106104189/ |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | 2 | - | - | 2 | - | - | 1 | - | - |
| CO2 | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - |
| CO3 | 2 | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - | - |
| CO4 | 2 | 1 | - | 2 | - | - | - | - | - | - | - | - | 1 | 2 | - |
| CO5 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - |
| CO6 | 1 | - | 1 | - | - | - | - | - | - | - | - | - | 2 | 2 | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Minor Project I |
| **Course Code** | MCA 206 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 1 | 1 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | software development life cycle, Project life cycle, Knowledge of atleast one programming language, | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 : Understand the project Develpoment Life Cycle **(BL2-Understand)**<br>**CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)**<br>**CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)**<br>**CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction:- Purpose of Database Systems, Views of data, Data Models, Database language, Transaction Management, Storage Management, Database Administrator, Database Users, Overall System Structure, Different types of Database Systems E-R Model: Basic Concepts, Design Issues, Mapping Constraints, Keys, E-R Diagram, Weak Entity set, Extended E-R features, Design of an E-R Database Schema, Reduction of an E-R schema to Tables. | Lectures with whiteboard/PPT,PBL | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Develop Synopsis for the proposed / chosen topic | PBL | BL2-Understand | 10 |
| 2 | Develop prototype of the ysstem proposed | PBL | BL3-Apply | 30 |
| 3 | Performa testing on the modules and the ysstme as a whole | Experiments | BL4-Analyze | 10 |
| 4 | incoporate the changes required based on testing result | PBL | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 2 | - | - | 2 | - | - | 1 | - | - | 2 | 1 | 2 |
| CO2 | - | - | - | 2 | - | - | 2 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO3 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | - | - | - | 1 | - | - | - | - | - | 2 | - | - | 1 | 1 | 3 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Data WArehousing and Mining |
| **Course Code** | MCA 301(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and field work | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Student should be familiar with Discrete Mathematics, Probability, Statistics, Data structures and basics of RDBMS. | | | **Co-Requisite/s** | Student should be familiar with Discrete Mathematics, Probability, Statistics, Data structures and basics of RDBMS. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the data Warehouses, Operational Data Stores (ODS) and OLAP characteristics.(BL1)**(BL1-Remember)**<br>**CO2-** .Understand the data mining concept, application and their usage .(BL2)**(BL2-Understand)**<br>**CO3-** Analyze the frequent patterns using association analysis algorithms like apriori, FP-growth. **(BL3-Apply)**<br>**CO4-** Understand the concept of classification, different classification algorithms **(BL4-Analyze)**<br>**CO5-** Understand the concept of clustering and different cluster analysis**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Data Mining, its importance, Kind of Data Mined, Data Mining Functionalities, Classification of Data Mining Systems, Major issues in Data Mining, Data Mining Primitives, Architecture of Data Mining Systems. | LECTURING | 10 |
| 2 | Needs of Data Preprocessing, Data Cleaning, Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. Data Warehouse Concepts: Architecture, Operations, Multidimensional Data Model, Data Warehouse Implementation, Data Cube Technology, Aggregation, OLAP Functions and Tools. | LECTURING | 9 |
| 3 | ssociation Rule Mining, Apriori Algorithm, Single□DimensionalBooleanAssociationRulesfromTransactionalDatab ases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining. | CASE STUDY | 8 |
| 4 | Classification and Prediction Methods Comparison, Classification by Decision Tree Induction, Bayesian Classification, Classification by Association Rule Analysis. Clusters Analysis: Introduction, Types of Data in Cluster Analysis, Categorization of Major Clustering Methods - Partitioning Methods: K-Means and K-Med oids, Hierarchical Methods: Agglomerative and Divisive | PBL | 10 |
| 5 | Applications of Data Mining: Mining Data Streams, Time Series Data, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining World Wide Web ,Social Impacts of Data Mining. | LECTURING | 8 |

Part C


Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Jiawei Han, Micheline Kamber Data Mining Concepts and Techniques<br>Arun K. Pujari Data Mining Techniques |
| **Articles** | |
| **References Books** | M. H. Dunham Data Mining – Introductory and Advanced Topics |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO3 | 2 | - | - | - | 1 | - | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | - | - | - | 2 | 2 | 2 | - | 2 | - | - | - | - | 2 | 2 | 2 |
| CO5 | - | - | 1 | - | - | 2 | - | 1 | - | - | 1 | 1 | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Cloud Computing |
| **Course Code** | MCA 302 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 0 | 4 |
| **Course Type** | Theory only | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Students must be familiar with the concepts of Information Technology, Database Management Systems and Data Structures. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the concepts of Cloud Computing, Virtualization, and data-intensive cloud computing**(BL1-Remember)**<br>**CO2-** To understand the Basic concept of Computer networks, Cloud Computing, big data, and various Cloud Web Services for different applications.**(BL2-Understand)**<br>**CO3-** To apply various virtualization tools in cloud computing.**(BL3-Apply)**<br>**CO4-** To analyze the current issues in cloud computing like its security, energy efficiency, and data handling for different business areas.**(BL4-Analyze)**<br>**CO5-** To evaluate and deploy various applications in a Cloud Computing environment to solve real-world problems.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG13(Climate action) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| I | Overview of Cloud Computing : Vision of cloud computing, Defining a cloud, cloud computing reference model, Historical developments, Cloud computing services, types of clouds, Characteristics, benefits and cloud computing challenges. | Lecturing | 8 |
| II | Virtualization : Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Pros and cons of virtualization, Technology- Xen, VMware, Microsoft Hyper-V, Economics of the cloud, Federation, Presence, Identity, and Privacy in the Cloud-Federation in the Cloud, Presence in the Cloud, Privacy and Its relation to Cloud-Based Information Systems, Secure Software Development Life Cycle (SecSDLC). | Lecturing | 9 |
| III | High throughput Computing : Data-Intensive Computing-Introduction, characterizing data-intensive computations, Historical perspective, Challenges ahead, Technologies for data-intensive computing, Concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi- cloud management systems. Implementing Multi-Cloud Management System (e.g. RightScale Cloud Management System). | Lecturing | 10 |
| IV | Business Clouds : Cloud Computing in Business, Various Biz Clouds focused on industry domains, Amazon Web Services, Google AppEngine, Microsoft Azure. Scientific Applications-Healthcare: ECG Analysis in the Cloud, Geoscience: Satellite Image Processing, Business and Consumer Applications- CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming. | Application Based Activity, Project Based Activity, Online Certification | 10 |
| V | Future directions in Cloud Computing : Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security. Energy efficiency in clouds, Market-based management of clouds, Third-party cloud services, Current issues in cloud computing leading to future research directions. | Project Based Activity, Research Paper Writing | 10 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| IV | Simple Web Application Deployment: :students needs to build a simple web application (e.g., static website) and deploy it on a cloud platform. | PBL | BL6-Create | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |

Part E

| | |
|---|---|
| **Books** | Bunya, R. K., Bromberg, J., & Goscinski, A. (2011). Cloud computing: Principles and paradigms [Fourth Edition]. Wiley.<br>Buyya, R., Vecchiola, C., & Selvi, S. T. (2013). Mastering Cloud Computing. Tata McGraw-Hill.<br>Ritting House, J. W., & Ramsome, J. F. (2011). Cloud Computing. CRC Press. |
| **Articles** | - |
| **References Books** | Kaittwang, G. C., Fox, G. C., & Dongarra, J. J. (2017). Distributed and Cloud Computing. Elsevier India.<br>Shroff, G. (2017). Enterprise Cloud Computing. Cambridge University Press. |
| **MOOC Courses** | https://nptel.ac.in/courses/106105167 |
| **Videos** | - |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 1 | - | - | 3 | 2 | 3 |
| CO2 | 3 | 1 | 1 | 2 | 2 | 3 | - | - | - | 1 | - | - | 3 | - | 3 |
| CO3 | 3 | 3 | 1 | - | 2 | 2 | - | - | - | - | - | - | 3 | 3 | 3 |
| CO4 | 3 | 3 | - | 2 | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 2 | 3 | - | 1 | 2 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Web Technologies |
| **Course Code** | MCA 303 (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Minor | | | | | | | |
| **Pre-Requisite/s** | basic knowledge computer file system. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To remember various Web Development Strategies and syntax rules of web Programming and PHP**(BL1-Remember)**<br>**CO2-** CO2: To understand the basics of web architecture, Types of architecture, knowledge about web protocols and web development concepts of PHP**(BL2-Understand)**<br>**CO3-** CO3: To implement: HTML, CSS, JavaScript and XML , PHP and mysql language to create static and dynamic web pages and interactive web applications.**(BL3-Apply)**<br>**CO4-** CO4: To analyze various Client-side programming techniques**(BL4-Analyze)**<br>**CO5-** CO5: To evaluate the web pages and layout with the help of Advanced CSS Techniques **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Prerequisite: basic knowledge computer file system. Introduction to Web Development: Introduction to Web technology ,Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development. Web Essentials: Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response. History of the internet, internetworking concepts, architecture, and protocol: switch, router, protocols for internetworking, internet address and domains. working of web browser and web server, Web server and its deployment, N-tier architecture, services of web server, Common gateway interface (CGI), Uniform Resource Locator (URL), format of the URL. | Lecturing | 10 |
| 2 | Web Page Designing HTML: list, table, images, forms, Basics of HTML, formatting and fonts, commenting code, color, hyperlink, list, forms, XHTML, Meta tags, Character entities, frames and frame sets,Browser architecture and Web site structure. Overview and features of HTML5 | Lecturing,experiments | 10 |
| 3 | Style Sheets CSS-Introduction to Cascading Style Sheets, Features, Core Syntax, Style Sheets and HTML Style Cascading and Inheritance, Text Properties, Box Model, Normal Flow Box Layout, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding .lists, positioning using CSS, CSS2, Overview and features of CSS3 | Lecturing,Experiment | 8 |
| 4 | Scripting Java script: Scripting Java script: Introduction, documents, forms, statements, functions, objects; event and event handling; Introduction to client and server side scripting, data types, operators, conditional statement, loops in Java script, functions, arrays, objects and elements in Java script, form validation using Java script. Advance script, Javascript and objects, Javascript own objects, the DOM and web browser environments, forms and validations DHTML: Combining HTML, CSS and JavaScript, events and buttons, controlling your browser | Lecturing,Experiment | 9 |
| 5 | PHP (Hypertext Pre-processor): PHP Programming: Introducing PHP: Creating a PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. Working with forms and Databases such as MySQL. | Lecturing,Experiment | 9 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Create a specimen of corporate web page. Divide the browser screen into two frames. The frame on the left will be a menu consisting of hyper links. Clicking on any of these link will lead to a new page, which must open in a target frame which is on right side. | Experiments | BL2-Understand | 7 |
| 2-3 | Write a java script code block, which validates a user name and password against hard coded values. If either name or password field is not entered display an error message showing “You forgot one of the required fields. Please try again” In case the field matched do not match the hard coded values, display an error message showing : “Please enter a valid user name and password” If the field entered matched , Display the following message: “Welcome (Username)“. | Experiments | BL4-Analyze | 7 |
| 4-5 | Intelligent Tourist Guide: Nowadays people use mobile phones and other mobile devices. Most of us have a small computing device that is always with us. People use it example for calling, as calendar and organizer. Mobile devices with GPS receiver are also used to find paths in navigation. The main idea of this thesis was to design a system that will run on most of phones and palms and will be helpful when visiting some new places and cities. | PBL | BL5-Evaluate | 30 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Jackson, J. C. (2018). Web Technologies: A Computer Science Perspective. Prentice Hall.Science Perspective; |
| **Articles** | |
| **References Books** | Bayross, I. (2015). Web Enabled Commercial Applications Development using HTML, DHTML, JavaScript, Perl CGI. BPB Publications. Beighley, L., & Morrison, M. (2019). Head First PHP & MySQL: A Brain-Friendly Guide. O'Reilly. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | - | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO3 | 2 | 1 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Block Chain |
| **Course Code** | MCA 304 -C (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Specialization Elective Courses | | | | | | | |
| **Pre-Requisite/s** | Prerequisite: Students must be familiar with Cryptography Techniques, Data Structures and Algorithms, Introduction to Programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember Cryptography Techniques, Data Structures and Algorithms**(BL1-Remember)**<br>**CO2-** To understand the concept and working of blockchain technology, various application areas like cryptocurrency, digital ledger etc. And role of cryptography in blockchain.**(BL2-Understand)**<br>**CO3-** To implement the cryptography and mining to implement blockchain ledger and to implement security.**(BL3-Apply)**<br>**CO4-** To analyze the role of miner sin blockchain. Application of blockchain in multiple areasandhowitprovidessuchaneffectivesecuremechanismofhandlingandmaintainingdataorrecords**(BL4-Analyze)**<br>**CO5-** To evaluate the performance characteristics of blockchain in comparisonto available technologies and what features of blockchain make its oeffective.**(BL5-Evaluate)**<br>**CO6-** To prepare a scenario to observe the performance evaluation of blockchain in comparison to contemporary technologies and to observe the potential application areas**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Basic Cryptography: Fundamentals Principles of Cryptography, Secret Key cryptography, Public Key Cryptography, Hash function, Digital Signature. Distributed Database, Byzantine General problem and Fault Tolerance. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 2 | Introduction Overview of Blockchain, Public vs Private Blockchain, Application of Blockchain, Blockchain Hashing Algorithm, Hash pointe rand Merkle tree, Blockchain Immutable Ledgers, P2P Network, DistributedP2P Network, Blockchain Mining Overview. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 3 | Understanding Blockchain with Cryptocurrency Bitcoin and Block chain, Bitcoin monetary policy, Bitcoin Mining Work, Working with Consensus in Bitcoin, Proof of Work (PoW), Proof of Stack (PoS), Mining Pool, Nonce Range, Timestamp, Mem pool. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 4 | Understanding Blockchain for Enterprises Blockchain: Permissioned model and use cases, Design issues for Permissioned blockchains, Enterprise application of Blockchain: Cross border payments, Know Your Customer (KYC), Food Security, Mortgage over Blockchain, Blockchain enabled Trade | Lectures with white board/PPT, Recorded video/interactive videos | 8 |
| 5 | Blockchain application development Hyperledger Fabric Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, writing smart contract using Hyperledger Fabric, writing smart contract using Etherem. | Lectures with white board/PPT, Recorded video/interactive videos | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1-2 | Assignment | Experiments | BL2-Understand | 7 |
| 3-4 | Activity | Experiments | BL3-Apply | 8 |
| 1-5 | Project | PBL | BL6-Create | 20 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | MelanieSwan BlockChain:BlueprintforaNewEconomy O'Reilly |
| **Articles** | DanielDrescher BlockChainBasics Apress;1stedition |
| **References Books** | ImranBashir Mastering Block Chain: DistributedLedgerTechnology,Decentralization and SmartContractsExplained PacktPublishing |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 2 | 2 | 1 | - | 2 | - | - | - | - | - | - | 2 | 1 | 3 |
| CO2 | - | 1 | 2 | 1 | 1 | - | - | - | - | - | - | - | 1 | 2 | - |
| CO3 | - | 1 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 1 |
| CO4 | - | - | 1 | - | - | 1 | - | - | - | - | - | - | 2 | 1 | 1 |
| CO5 | - | 2 | 2 | - | 1 | 2 | - | - | - | - | - | - | 1 | 2 | 3 |
| CO6 | - | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | 2 | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Cyber Security fundamentals and Cyber Audit Essentials |
| **Course Code** | MCA 304(B) (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Knowledge of Computer Network , Computer Architecture , Digital principals is essential | | | **Co-Requisite/s** | Knowledge of internet browsers and virtual eenvironment creation is must | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understand the cybercrimes, Various attacks performed on network and technique of auditing the digital devices **(BL1-Remember)**<br>**CO2-** Apply the principles of identification of crimes and apply it to prepare the audit report. **(BL2-Understand)**<br>**CO3-** Analyze the data from digital devices for forensic analysis and finalize the audit report **(BL4-Analyze)**<br>**CO4-** Evaluation of various crimes and the techniques applied to perform the crimes in digital world. **(BL5-Evaluate)**<br>**CO5-** Create automated applications for detection of crimes **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit I | Introduction to Cyber Crime and Cyber Laws Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Cyber Laws and Ethics. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 10 |
| Unit II | Cyber Crime Issues and Investigation Unauthorized Access, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation, Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses, Investigation Tools, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Search and Seizure of Computers, Password Cracking . | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 12 |
| Unit III | Biometric Systems and its Security Biometric fundamentals, Biometric technologies, Biometrics Vs traditional techniques, Biometric System and Security essentials, Privacy Issues in Biometric Security, Standards in Biometric security, | Lectures with whiteboard/PPT, Recorded video/interactive videos, Case sTudy | 9 |
| Unit IV | Digital Evidence Cyber crime and digital evidence: what is cyber crime, types of cyber crimes, digital evidence, Digital Vs Physical Evidence, Nature of Digital Evidence, Precautions while dealing with Digital Evidence, Digital Evidence Collection, Evidence Preservation, Recovering Deleted Evidences, | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 11 |
| Unit V | Digital Auditing Cyber Audit Essentials, Compliance Audit, International Standards, ISO27001, Audit of Windows Systems, Audit of Linux systems, Audit of network devices (Switch/Servers), Audit of Websites and Web Applications. Steps for hardening your System. Preparation of an Audit Report. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 10 |

Part C

Lab 1

Tools used : Wire Shark

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Digital Forensics, DSCI - Nasscom, 2012.<br><br>John R Vacca, “Biometric Technologies and Verification Systems”, Elsevier Inc, 2007<br>Cyber Crime Investigation, DSCI - Nasscom, 2013. |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | 2 | 2 | 3 | 2 | 1 | - | 2 | - | - | - | 2 | 2 |
| CO2 | 1 | - | - | 3 | 3 | 2 | - | 2 | - | 1 | - | - | 2 | 3 | 2 |
| CO3 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | - | 3 | - | 1 | 3 | 3 | 2 |
| CO4 | - | 2 | 2 | 3 | 2 | - | - | - | - | - | - | 1 | 1 | - | 3 |
| CO5 | - | 2 | 2 | 1 | - | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Data Analytics |
| **Course Code** | MCA 305(A) (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Specific Elective | | | | | | | |
| **Pre-Requisite/s** | Knowledge of basic python programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: To understand the fundamentals of Big Data. **(BL1-Remember)**<br>**CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)**<br>**CO3-** CO3: To explore tools and practices for big data and Visualization.**(BL3-Apply)**<br>**CO4-** CO4: To recognize the role of business intelligence and visualization in decision making. **(BL4-Analyze)**<br>**CO5-** CO5: To analyze data using Power BI, Tableau etc. **(BL5-Evaluate)**<br>**CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction To Data Handling - Overview of Data analysis, Working with statistical formulas - Logical and financial functions, Data Validation & data models, Power Map for visualize data. | Lecturing | 9 |
| Unit-2 | Introduction To Data Manipulation - Using Function: Introduction to Power BI using data, Heat Map, Tree Map, Smart Chart, Column Chart, Line Chart, Pie, Bar, Area, Scatter Chart, Data Series, Chart Sheet , Trend line, Error Bars, What-If Analysis. | Lecturing,Experiments | 9 |
| Unit-3 | Data Visualization: Getting Start With Tableau &Amp; Power BI: Getting start with Tableau & Power BI: What is Tableau? What does the Tableau product suite comprise of? How Does Tableau Work? Tableau Architecture, What is My Tableau Repository? Connecting to Data & Introduction to data source concepts, Understanding the Tableau workspace, Dimensions and Measures, Data Types & Default Properties. Creating Dataset from data model in Power BI. | Lecturing,Experiments | 9 |
| Unit-4 | Data Strategy Understanding Product & Category, Competitive Analysis, Market Share understanding - Market potential Index, Seasonality-Sales Trending. | Lecturing,PBL | 9 |
| Unit-5 | Consumer behaviour Analytics - mind and market factors, Budget planning & Execution-MIMI, Regression Correlation Analysis for Sales trending. | Lecturing,PBL | 9 |

Part C

# Data Analytics

## List of Experiments

1. Install, configure and run python, numPy and Pandas.
2. Install, configure and run Hadoop and HDFS.
3. Visualize data using basic plotting techniques in Python.
4. Implement NoSQL Database Operations: CRUD operations, Arrays using MongoDB.
5. Implement Functions: Count – Sort – Limit – Skip – Aggregate using MongoDB.
6. Implement word count / frequency programs using MapReduce.
7. Implement a MapReduce program that processes a dataset.
8. Implement clustering techniques using SPARK.
9. Implement an application that stores big data in MongoDB / Pig using Hadoop / R.

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## PBL Submission Guideline

**Subject Name: Data Analytics**

| Sr. No | Submission to be done | Submission Required | Marks Allotment |
|---|---|---|---|

| No. | | | Allotment |
|---|---|---|---|
| 1 | Select Project Topic and team submission | Small presentation | 2 |
| 2 | Introduction & Objective of Project | PBL file | 3 |
| 4 | Background Study and the existing gap in particular area | PBL file | 5 |
| 5 | System Design (Flowcharts/Block Diagrams/ Algorithms/DFD/ERdiagrams),Implementation of code, and submission of Running model. | PBL File & Implementation | 10 |
| 7 | Final Project file submission (Strictly as per the format) | Presentation & Viva Voce | 10 |

**Topic List:**

## Create PBL on any given Topic

1. Traffic control using Big Data
2. Search Engine
3. Medical insurance fraud detection
4. Data warehouse design for an E-Commerce site
5. Big Data Cyber security
6. Crime Detection
7. Disease prediction based on symptom
8. Recommendation System
9. Anomaly detection in Cloud Servers
10. Smart cities using Big Data
11. Tourist behavior analysis
12. Web Server Log analysis

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Eaton, C., Deroos, D., et al. (2017). Understanding Big Data. McGraw-Hill. |
| **Articles** | |
| **References Books** | Prajapati, V. (2016). Big Data Analytics with R and Hadoop. Packt Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | 1 | 2 | 2 | - | - | - | - | - | - | 2 | 3 | 3 |
| CO2 | 3 | - | 1 | 1 | 2 | 3 | - | - | - | - | - | - | 2 | 3 | 2 |
| CO3 | 3 | 2 | 2 | 1 | 2 | 2 | - | - | - | - | - | - | 2 | 3 | 3 |
| CO4 | 3 | 3 | 1 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO6 | 2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 3 | 3 |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Digital Forensic and Analytics |
| **Course Code** | MCA 305(B) (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic knowledge of computer fundamentals, hardware, algorithms and basic concepts of network. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remembering Computer Network basics and Network Defense Essentials**(BL1-Remember)**<br>**CO2-** Understand the concepts of Digital Forensics Digital investigation, Digital crime scene Evaluation process**(BL2-Understand)**<br>**CO3-** Apply to the identification of crime and investigate (apply).**(BL3-Apply)**<br>**CO4-** Analyze the data from digital devices for forensic analysis and finalize the audit report(Analyse)**(BL4-Analyze)**<br>**CO5-** Evaluating Evaluation of various crimes and the techniques applied to perform the crimes in digital world.(Investigate)**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG10(Reduced inequalities) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction to Digital Forensics: Digital investigation, Digital crime scene evaluation process, Search & Seizure, Digital Forensic Lab Setup, Dead v/s Live Forensics, Types of Digital Evidences, Disk Imaging, Write Blockers, Data Recovery, Chain of Custody, Standard Operating Procedures, Investigation Guidelines, overview of tools, Slack Space, Virtual paging, Volatile Evidence Acquisition, Collection & Analysis | Lecturing, Experiments, | 7 |
| 2 | Volume Analysis & File Systems Introduction, PC based partitions- DOS partitions, UNIX partitions, RAW partition, UNIX Console Log, Removable media, Server based partitions- BSD partitions, GPT & MBR partitions, multiple disk volumes- RAID, Disk Spanning, file system, File system category, FAT concepts and analysis, FAT data structure- Boot sector, FAT 32 FS info, Directory entries, Long file name directory entries, NTFS File System concepts, NTFS Analysis, NTFS data structure, Standard file attributes, Index attributes and data structures | Lecturing, Experiments, Case Study | 8 |
| 3 | Digital Evidence Analysis Potential Evidences, Evidence collection form different devices, Artifact interpretation, Operating System artifacts analysis, Network Artifacts analysis, File Signatures, Registry Forensics, Last user Activity, MRU, NTUSER.DAT, MFT concepts, MFT Forensics,Multimedia Forensics, Metadata Analysis, Browser Forensics, History Extraction, Cookies based artifacts, Autofill Forms, Cache, Temp file, MAC OS Artifacts analysis, Linux OS Artifact Analysis | Lecturing, Experiments, Case Study | 10 |
| 4 | NIX File Systems UNIX, Ext2 and Ext3 data structures, iNodes, Super block, group descriptor tables, Block bitmap, Extended attributes, Directory Entry, Symbolic Link, Hash trees, Journal data structures, UFS1 and UFS2 concepts and analysis, NFS Files Systems, HFS File Systems, CDF File systems, Hadoop File systems | Lecturing, Experiments, Case Study | 10 |
| 5 | Forensic Tools Forensic tools collection, Automated v/s manual techniques, Open source forensic tools, Developing scripted tools for basic level investigation, Usage tools for disk imaging and Data recovery, Encase and FTK tools, Autopsy, UFED, XRY, Volatility, Rekall, RedLine, Network Miner, Anti forensics Techniques, Counter anti forensics. | Lecturing, Experiments, Case Study | 10 |

Part C

## Activity I

## (Digital Forensic and Analytics)

## Activity type: Survey

## Individual Activity

**Guidelines:**

1. Create a questionnaire for testing general cyber security measures a layman should adopt . Each question in the questionnaire should contain one mark and should have four options for answer. No descriptive questions should be there in the questionnaire.

2. The questionnaire should contain 25 questions related to using safety measures an individual should take to safe guard his / her laptop / mobile/ tab etc.

3. In addition to these questions the questionnaire should also contain following questions which should have descriptive questions: Name, City, state, age as on 1.07.2023, gender, profession (This should be a dropdown list having following options: home maker, Service, Self-employed, student, teacher), phone no./ email id

4. The questionnaire should be shared with at least 50 people and at least 40 entries should be recorded.

5. This assignment should be created as a goggle form and the form as well as the excel sheet of responses should be uploaded as submission.

6. This is an individual activity and not a group activity.

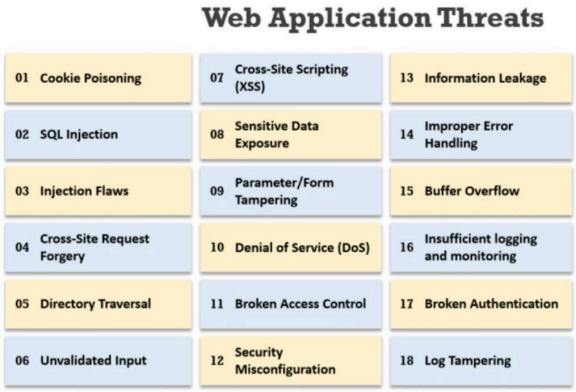
**Activity II**

**Digital Forensic and Analytics**

**Case Study**

**Guidelines:**

1. This is an individual activity.
2. Please refer to the following list of web application threats and select any three of them:




3. Document the following about the threats selected:
    a. Attack Surface(s)
    b. Attack Vector(s)
    c. Methodology used for attack in form of block diagram
    d. An example or case study of this kind of attack performed
    e. Ways/methods/ tools/ command to detect the attacks in following environment:
        i. Window's
        ii. Linux
4. Comparative analysis of the attacks under consideration on following parameters:
    a. Attack surfaces used
    b. IOC
    c. Possible Damage level
5. The report should be in MS- word format on an A-4 size paper.
6. The report should be submitted in soft copy online as well as hard copy

## MCA-305 (Digital Forensic and Analytics)

1. Study of Computer Forensics and different tools used for forensic investigation
2. How to Recover Deleted Files using Forensics Tools
3. How to make the forensic image of the hard drive using FTK Forensics.
4. How to used sniffer tool in network forensics.
5. How to View Last Activity of Your PC
6. How to prepared the RAM Dump using FTK Tool
7. How to Collect Email Evidence in Victim PC
8. Find Last Connected USB on your system (USB Forensics)
9. Live Forensics Case Investigation using Autopsy
10. Comparison of two Files for forensics investigation by Compare IT software

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Carvey, H. A. (2014). Windows Forensic Analysis Toolkit: Advanced Analysis Techniques for Windows 7. Syngress. |
| **Articles** | |
| **References Books** | Marshall, A. M. (2008). Digital Forensics: Digital Evidence in Criminal Investigation. Wiley-Blackwell. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| CO2 | - | 1 | 1 | 1 | 2 | - | - | - | - | - | - | - | 1 | 2 | 1 |
| CO3 | 2 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | 2 | 1 | 2 | - | - | - | - | - | - | - | - | 2 | 1 | 3 |
| CO5 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | 1 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Full Stack Development |
| **Course Code** | MCA 305- C( T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | To become knowledgeable about the most recent web development technologies and learn core concept of both front end and back end programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember about the front end and back end Tools.**(BL1-Remember)**<br>**CO2-** To understand the basics of web architecture, find and use code packages based on their documentation to produce working results in a project**(BL2-Understand)**<br>**CO3-** Implementation of web application employing efficient database access. **(BL3-Apply)**<br>**CO4-** Create web pages that function using external data and analyze them.**(BL4-Analyze)**<br>**CO5-** To develop a fully functioning website and deploy on a web server.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG3(Good health and well-being)<br>SDG4(Quality education)<br>SDG5(Gender equality)<br>SDG8(Decent work and economic growth)<br>SDG12(Responsible consuption and production) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Web Development Basics: Web development Basics - HTML & Web servers Shell - UNIX CLI Version control - Git &Github HTML, CSS | Lecturing | 10 |
| 2 | Frontend Development: Javascript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format. | Lecturing & Experiments | 8 |
| 3 | REACT JS: Introduction to React React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication | Lecturing & Experiments | 9 |
| 4 | Java Web Development: JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring RESTful API using Spring Framework Building an application usingMaven | Lecturing & Experiments | 10 |
| 5 | Databases & Deployment: Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles and deploying application in Cloud | Lecturing & Experiments | 9 |

Part C

This plugin is not supported

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Duckett, J. (2014). Web Design with HTML, CSS, JavaScript and JQuery Set. Wiley.<br>Nixon, R. (Year). Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites. O'Reilly Media. |
| **Articles** | |
| **References Books** | Bush, E. (2016). Full-Stack JavaScript Development. Red Sky Productions LLC.<br>Dyl, T., Przeorski, K., & Czarnecki, M. (2017). Mastering Full Stack React Web Development. Packt Publishing. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | 1 | - | 1 |
| CO2 | - | 1 | 1 | 1 | 3 | - | - | - | - | - | - | - | 2 | - | 3 |
| CO3 | 2 | 1 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 1 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Minor PRoject |
| **Course Code** | MCA 306 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 3 | 3 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | sofetware development life cycle, Project life cycle | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 : Understand the project Develpoment Life Cycle **(BL2-Understand)**<br>**CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)**<br>**CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)**<br>**CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Develop Synopsis for the proposed / chosen topic | PBL | BL2-Understand | 10 |
| 2 | Develop prototype of the ysstem proposed | PBL | BL3-Apply | 30 |
| 3 | Performa testing on the modules and the ysstme as a whole | Experiments | BL4-Analyze | 10 |
| 4 | incoporate the changes required based on testing result | PBL | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 2 | - | - | 2 | - | - | 1 | - | - | 2 | 1 | 2 |
| CO2 | - | - | - | 2 | - | - | 2 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO3 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | - | - | - | 1 | - | - | - | - | - | 2 | - | - | 1 | 1 | 3 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Dissertation / Industrial Training/ |
| **Course Code** | MCA 401 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 4th | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 20 | 20 |
| **Course Type** | Project | | | | | | | |
| **Course Category** | Projects and Internship | | | | | | | |
| **Pre-Requisite/s** | sofetware development life cycle, Project life cycle | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1 : Understand the project Develpoment Life Cycle **(BL2-Understand)**<br>**CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)**<br>**CO3-** CO3 : Analize the performance of the system developed using standard techniques for testing **(BL4-Analyze)**<br>**CO4-** CO4 : Evaluate the performance of the system developed against the performance of similar tools./ systems **(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Industrial Training Track | Option 1: The student will be subjected to a 4.5 months of Industrial Training at some IT Industry / Software Industry or IT support department in any industry. The student will work on real time software / IT support systems and gain insight into real time application development. At the end of training the student has to submit a finishing and relieving certificate issue b the organization where he/ she has taken up the training. the evaluation will be done on the basis of presentation and project report submitted by the student. | Industrial Training | 20 |
| Dissertation Track | Option 2: The studnet can take up dissertation work under the guidance of approved PG guides of the department on any upcoming technology / domain. During the dissertation work it is mandatory for the student to publish at least two research articles in any UGC CARE listed Journals (Preferably SCOPUS indexed ) | | |
| Submission of Report | On completion of the Industrial Training / Dissertation the student has to submit project report in three copies along with the certificate form the organization in case of Industrial Training and from guide and HoD in case of Dissertation work. The evaluation of the student will be done based on the project report submitted and presentation of the work done. | | |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Develop Synopsis for the proposed / chosen topic | PBL | BL2-Understand | 10 |
| 2 | Develop prototype of the system proposed | PBL | BL3-Apply | 30 |
| 3 | Performa testing on the modules and the ysstme as a whole | Experiments | BL4-Analyze | 10 |
| 4 | incoporate the changes required based on testing result | PBL | BL3-Apply | 10 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 500 | 250 | 200 | 100 | 100 | 50 |

Part E

| | |
|---|---|
| **Books** | |
| **Articles** | |
| **References Books** | |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 2 | - | - | 2 | - | - | 1 | - | - | 2 | 1 | 2 |
| CO2 | - | - | - | 2 | - | - | 2 | - | - | 2 | - | - | 1 | 2 | 1 |
| CO3 | - | - | - | - | - | - | 1 | - | - | - | - | - | 2 | 2 | 1 |
| CO4 | - | - | - | 1 | - | - | - | - | - | 2 | - | - | 1 | 1 | 3 |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Object Oriented Programming With Java |
| **Course Code** | MCA-102[T] |

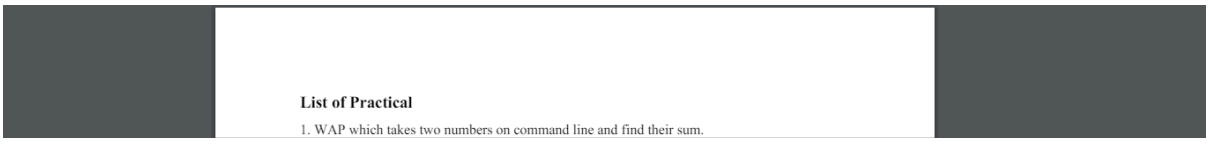
Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 1 | 3 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | basic knowledge of any one programming language such as C/C++ | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax rules of java programming**(BL1-Remember)**<br>**CO2-** To understand various Object-Oriented Concepts, Exception handling, Multithreading, networking and database connectivity techniques**(BL2-Understand)**<br>**CO3-** To implement java AWT and Swing and for GUI Programming and Event handling, java IO for Input and output handling, jdbc for database connectivity**(BL3-Apply)**<br>**CO4-** To analyze various Error ,and Database Handling techniques to learn how to improve the performance of the java application.**(BL4-Analyze)**<br>**CO5-** To evaluate and compare various application Development techniques**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of java Introduction to JAVA History of Java: Comparison of Java and C++; Java as an object oriented language: Java buzzwords; JVM and JRE;A simple program, its compilation and execution; the concept of path and class path: Java Basics: Data types; Operators- precedence and associatively; Type conversion; decision making controls – if, if ..else, switch; loops – for, while, do…while; advanced for loop. Special statements–return, break, continue, Modular programming: methods and method overloading, memory allocation and garbage collection, static keyword Object Oriented Programming in Java: Class fundamentals, java Packages, Access specifies, Constructors; Copy constructor; this pointer; finalize () method, array and String, mutable and immutable; String Buffer | Lecturing | 15 |
| 2 | Java Inheritance: Inheritance basics, method overriding, polymorphism, static and dynamic polymorphism Abstract Class & Interfaces: abstract classes, uses of abstract classes, implementation of abstract class, defining an interface, implementing & applying interfaces, extending interfaces Exception Handling; understanding Exception and its classes; class hierarchy for Throwable, call stack mechanism, checked and unchecked Exception. Try, catch and finally block, throw and throws clause. Multithreading: Basic idea of a Thread, differences between process and Thread, multithreaded programming; different states of a Active thread, The lifecycle of a thread; Creating thread with the thread class and runnable interface, thread constructor and thread methods; Thread synchronization; Thread scheduling; Producer consumer relationship; Daemon thread, Selfish threads, interthread communication. | Lecturing | 10 |
| 3 | Java AWT: The class hierarchy of window fundamentals; The basic user interface components Label, Button, Check Box, Radio Button, menu and Choice menu, Text area, Frame; Layout managers Java Applets: Introduction of java Applet, Life cycle of applet; HTML Tags for applet. Java Swing: JAVA Foundation Classes, Working with JFrame,JLabel, JApplet, JPanel,JCheckBox, JList,JComboBox, JRadioButton, JList, Jscrollpane, JComboBox, JMenu, JMenuBar, JMenuItem, JTable, JProgressBar, JSpinner,JFileChooser , JColorSchooser | Experiment | 9 |
| 4 | Java Event Handling Model: Java's event delegation model – ignoring the event, Self-contained events, Delegating events; The event class hierarchy; The relationship between interface, methods called, parameters and event source, Event listeners: ActionListener, MouseListener,KeyListener JAVA Database Connectivity (JDBC): JDBC Drivers, Connection Interface, Result set types of Result Set, applying insert, delete, display and update operation JDBC with java AWT and Swing. | PBL | 7 |
| 5 | Stream Handling in java: Input/Output: Exploring Java i.o., Directories, stream classes, The Byte stream: Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams Reader and writer classes, file class. buffered reader, buffered writer, print writer, serialization Java Networking: Networking Basics: Socket, Client server, reserved sockets, proxy servers, Inet address, TCP sockets, UDP sockets, two-way communication using socket programming | PBL | 4 |

Part C


List of Practical

1. WAP which takes two numbers on command line and find their sum.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 20 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Naughton & Schildt The Complete Reference Java 2 Tata McGraw Hill |
| **Articles** | |
| **References Books** | Horstmann & Cornell "Core Java 2" (Vol I & II ) Sun Microsystems |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | 3 | 2 | - | - | - | - | - | - | - | - | - | 1 |
| CO2 | 2 | 2 | 1 | 1 | 2 | - | - | - | - | - | - | - | 3 | - | 3 |
| CO3 | 1 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | - | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | - | 1 | - | - | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Artificial Intelligence |
| **Course Code** | MCA-103[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 1 | 3 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | A basic understanding of computer science fundamentals is beneficial. This includes knowledge of algorithms, data structures, and computer programming. Proficiency in a programming language, such as Python or Java, is often assumed. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Remember: To remember various concept of Artificial Intelligence.**(BL1-Remember)**<br>**CO2-** Introduce: To introduce the basics concept of automation with the concept of Artificial Language.**(BL2-Understand)**<br>**CO3-** Implement: To Implementation, apply various Reinforcement Learning Model, FOPC, NLP Deep Learning techniques, Robotic Model, Problem Solving Techniques, Searching Techniques, Types of agents.**(BL3-Apply)**<br>**CO4-** Analyze: To analyze the performance of various Tools of Artificial Intelligence**(BL4-Analyze)**<br>**CO5-** Evaluate: To evaluate the performance of Efficient AI enabled model;**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth)<br>SDG11(Sustainable cities and economies) | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit -I | General Issues and Overview of AI: The AI problems, what is an AI technique, Characteristics of AI applications. Introduction to LISP programming: Syntax and numeric functions, Basic list manipulation functions, predicates and conditionals, input output and local variables, iteration and recursion, property lists and arrays. | Lecturing | 6 |
| Unit -2 | Problem Solving, Search and Control Strategies General problem solving, production systems, control strategies forward and backward chaining, exhaustive searches depth first breadth first search. Heuristic Search Techniques Hill climbing, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems. | Experiments | 9 |
| Unit -3 | Knowledge Representations: First order predicate calculus, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency | Lecturing | 10 |
| Unit - 4 | Natural Language processing Parsing techniques, context free grammar, recursive transitions nets (RNT), augmented transition nets (ATN), case and logic grammars, symantic analysis. Game playing Minimax search procedure, alpha-beta cutoffs, additional refinements. Planning: Overview an example domain the block word, component of planning systems, goal stack planning, non linear planning. | Experiments | 10 |
| Unit -5 | Probabilistic Reasoning and Uncertainty: Probability theory, bayes theorem and bayesian networks, certainty factor. Expert Systems: Introduction to expert system and application of expert systems, various expert system shells, vidwanframe work, knowledge acquisition, case studies, MYCIN. Learning: Rote learning, learning by induction, explanation based learning. | Case Study | 10 |

# Case Study

**Rules/Instructions**

- Students are required to prepare Case study on any one of the topic.
- Typed (Properly formatted , at least 20 Pages with front page and index , summary )
- Students are required to upload the signed copy of case study on LMS within time line.
- It is an individual activity

**Topic : I.** Predicting Stock Market Trends using Machine Learning Algorithms
It must consist of following points-

- Overview of Machine Learning and algorithms.
- Emphasis should be given on literature review with respect to role of machine leaning in predicting stock market trends**.**
- Supporting data survey by the reputed organization/Journals can be added to case study.
- References

**Topic : II**

Integrating Expert Systems in Healthcare: A Case Study of Improved Diagnosis and Treatment
It must consist of following points -

- Key features of expert system.
- Architecture used in expert system
- Examples of expert system.
- Comparative study of expert systems used in healthcare Industry using literature survey.
- Results in graphs illustrating effectiveness of expert system in Diagnosis and Treatment
- References

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 20 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Rich, Elaine, Knight, Kevin. (1991). Artificial Intelligence 2nd ed. . Singapore: McGraw-Hill. |
| **Articles** | |
| **References Books** | Patterson, D. W. (1990, January 1). Introduction to Artificial Intelligence and Expert Systems. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 1 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 2 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 2 | 2 | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO4 | - | 2 | - | 3 | 1 | - | - | - | 3 | 1 | - | - | 2 | 3 | 3 |
| CO5 | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Computer Networks |
| **Course Code** | MCA-104[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 1 | 3 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Student must be familiar with the basic knowledge of computer fundamentals, hardware, algorithms and basic concepts of network | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** CO1: Remembering the concepts of computer networks, their types.**(BL1-Remember)**<br>**CO2-** CO2: Understand to the concept of Classfull and Classless addressing Network address Translation, Mobile IP.**(BL2-Understand)**<br>**CO3-** CO3: Apply to Unicast and Multicast Routing and Next Generation IP for networking.**(BL3-Apply)**<br>**CO4-** CO4: Analyze the applications to address the issues of Networking Technologies.**(BL4-Analyze)**<br>**CO5-** CO5: Evaluating to investigate routers, IP and Routing Algorithms in Network Layer**(BL5-Evaluate)**<br>**CO6-** CO6:Create and design networking models to using cisco packet tracer networking simulator, Network**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction: Computer Network, Layered Network Architecture-Review of ISO-OSI Model., Transmission Fundamentals: Communication Media-Conductive Metal (Wired Cable), Optical Fiber links, Wireless Communication-Radio links, Satellite Links. Network Topologies: Star, Bus, Ring, Transmission modes : Simplex, half duplex, full duplex. Communication Services & Devices: Types of service –connection oriented, connectionless, Telephone System., ISDN, Cellular Phone network. Modulation &Demodulation: Digital to Analog Conversion-Frequency Modulation (FM), Amplitude, Modulation (AM), Phase Modulation (PM)., Analog to Digital Conversion-Pulse Amplitude Modulation(PAM), Pulse Code Modulation (PCM), Differential Pulse Code Modulation, (DPCM)., Multiplexing: FDM, TDM and STDM | Lectures with whiteboard/PPT, Recorded video/interactive videos, | 8 |
| 2 | MAC Sub Layer: Contention Protocols, Stop-Go-Access Protocol, Aloha Protocols- Pure & Slotted, Carrier sense multiple access with collision detection (CSMA/CD) Data Link Layer: Functions of data link layer, Data Security and Integrity: Parity Checking Code, Cyclic redundancy checks (CRC), Hemming Cod. Flow control Protocols: Basic flow control, Sliding window Protocol-Go-Back-N protocol and selective repeat protocol, Protocol correctness- Finite state machine. | Lectures with whiteboard/PPT, Recorded video videos, programming labs | 10 |
| 3 | Local Area Network: Ethernet: 802.3 IEEE standard, Token Ring: 802.5 IEEE standard, Token Bus: 802.4 IEEE standard, FDDI Protocol, DQDB Protocol, Inter Networking, Layer 1 connections- Repeater, Hubs, Layer 2 connections- Bridges, Switches, Layer 3 connections- Routers, Gateways. | Lectures with whiteboard/PPT, Recorded video/interactive videos, programming labs | 9 |
| 4 | Wide Area Network: Introduction, Network Layer Functioning: Routing, Routing Tables, Types of routing, Dijkstra's Algorithm, Bellman-Ford Algorithm, Link state routing, Open shortest path first, Flooding, Broadcasting, Multicasting, Congestion & Dead Lock. Internet Protocols: IPV IV, IPV VI Transport Layer: Functions of Transport layer, handshaking, connection life cycle, Overview of TCP/IP, Transport protocols, Elements of Transport Protocol, Transmission control protocol (TCP), User data-gram protocol (UDP). . | Lectures with whiteboard/PPT, Recorded video videos, programming labs | 10 |
| 5 | Application Layer: Overview of DNS, SNMP, email, FTP, HTTP, WWW, Virtual Terminal Protocol, Multimedia. Network Security: Network Threats and its solution, Basics of cryptography, Cryptography | Lectures with whiteboard/PPT, Recorded video videos, programming labs | 9 |

# List of Experiments

| S *NO.* | **Index** |
|---|---|
| 1 | Performing an initial switch configuration. |
| 2 | Performing an initial how to connect two different networks using router configuration. |
| 3 | Simulate to Mesh Topology based network using CISCO Packet Tracer. |
| 4 | To Study of Internet connection in Local Area Network, Set the different IP addresses and subnet mask of the generic system cisco packet tracer. |
| 5 | Simulate the Network Topology and understand how can used to IP Address during the designing time. |
| 6 | Simulate to Star Topology based network using CISCO Packet Tracer. |
| 7 | Simulate to Ring Topology based network using CISCO Packet Tracer. |
| 8 | Simulate to BUS Topology based network using CISCO Packet Tracer. |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 20 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Behrouz A. ; Data Communications and Networking. ForouzanMcGraw-Hill. 2 Andrew S. Tanenbaum; Computer Networks; Pearson Prentice Hall Pearson Prentice Hall 3 Comer Douglas E .; Internetworking with TCP/IP, Volume 1, Fourth Edition Prentice Hall of India |
| **Articles** | B.M.Harwani and DT Editorial Services Advance Computer Network Dreamtech |
| **References Books** | 1 William J. Beyda Data Communication Prentice Hall 2 William Stallings Data and Computer Communications Pearson Prentice Hall |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 | 2 |
| CO2 | 1 | - | - | - | 2 | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO3 | 2 | - | - | - | 1 | - | 2 | - | - | - | - | - | 3 | 2 | 2 |
| CO4 | - | - | - | 2 | 2 | 2 | - | 2 | - | - | 1 | 1 | 2 | 2 | 2 |
| CO5 | - | - | 1 | - | - | 2 | - | 1 | - | - | - | - | 2 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Data Structures and applications |
| **Course Code** | MCA-105[T] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 2 | 0 | 1 | 3 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | To understand the contents and successfully complete this course, a participant must have a basic understanding of Storage Systems, Operating systems, Networking and Database. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** Understanding: comprehensive knowledge of the data structures;**(BL2-Understand)**<br>**CO2-** Applying: understand the importance of data and be able to identify the data requirements for an application;**(BL3-Apply)**<br>**CO3-** Analyzing: have a practical experience of algorithmic design and implementation;**(BL4-Analyze)**<br>**CO4-** Evaluating: practical experience of developing applications that utilize data structures and evaluating the performances of applications;**(BL5-Evaluate)**<br>**CO5-** Creating: develop projects requiring the implementation of various data structures**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Overview of Data Structure: Definition, types, various operations and applications. Stack and Queue: contiguous implementations of stack, various operations on stack, various polish notations-infix, prefix, postfix, conversion from one to another order using stack; evaluation of post and prefix expressions. Contiguous implementation of queue: Linear queue, its drawback; circular queue; various operations on queue | Lectures with whiteboard/PPT, Recorded video/interactive videos, case study | 7 |
| 2 | General List: list and it's contiguous implementation, it's drawback; singly linked list-operations on it; doubly linked list-operations on it; circular linked list; linked list using arrays. | Lectures with whiteboard/PPT, Recorded video/interactive videos, case study | 7 |
| 3 | Graph: related definitions: graph representations- adjacency matrix, adjacency lists, adjacency multi list; traversal schemes- depth first search, breadth first search; Minimum spanning tree; shortest path algorithm; kruskals & dijkstras algorithm. | Lectures with whiteboard/PPT, Recorded video/interactive videos, practical problems | 7 |
| 4 | Trees: definitions-height, depth, order, degree, parent and child relationship etc; Binary Trees- complete binary tree, almost complete binary tree; Tree traversals-preorder, in order and post order traversals, their recursive and non recursive implementations; expression tree- evaluation; Threaded binary trees; forests, conversion of forest into tree. | Lectures with whiteboard/PPT, Recorded video/interactive videos | 7 |
| 5 | Searching, Hashing and Sorting: requirements of a search algorithm; sequential search, binary search, indexed sequential search, interpolation search; hashing- basics, methods, collision, resolution of collision, chaining; Internal sorting- Bubble sort, selection sort, insertion sort, quick sort, merge sort, shell sort,heap sort, tree sort. | Lectures with whiteboard/PPT, Recorded video/interactive videos, Practical Labs | 7 |

Part C

# PBL ON DATA STRUCTURE

## Library Management System

- **Data Structures:** Linked Lists, Stacks, Queues, Trees (e.g., AVL Trees for indexing).
- **Project Overview:** Design and implement a system to manage book borrowing, returning, and inventory.
- **Tasks:**
- Implement a linked list to manage the catalog of books.
- Use stacks to handle book borrowing and returning history.
- Implement queues for managing waitlists for popular books.
- Use a tree structure for efficient search and categorization of books.

## 2. Social Network Analysis

- **Data Structures:** Graphs, Hash Tables.
- **Project Overview:** Analyze and model a social network to find connections, influencers, and communities.
- **Tasks:**
- Represent the network using an adjacency list or adjacency matrix.
- Implement algorithms to find the shortest path between users (e.g., Dijkstra's or BFS).
- Use hash tables to efficiently manage user data.
- Detect communities within the network using clustering algorithms.

## 3. E-commerce Recommendation System

- **Data Structures:** Hash Tables, Graphs, Trees (e.g., B-Trees for indexing).

- **Tasks:**
- Use linked lists to manage the sequence of messages.
- Implement Trie structures to allow fast search through the message history.
- Implement user management using hash tables.

## 9. Online Auction System

- **Data Structures:** Hash Maps, Heaps.
- **Project Overview:** Create an online platform for auctions with features like bidding and item management.
- **Tasks:**
- Use hash maps to manage auction items and user details.
- Implement heaps to manage bids and determine the highest bid efficiently.
- Develop real-time auction updates.

## 10. Hospital Management System

- **Data Structures:** Linked Lists, Queues, Trees.
- **Project Overview:** Design a system to manage patient records, doctor appointments, and hospital resources.
- **Tasks:**
- Use linked lists to maintain patient records.
- Implement queues to manage patient appointments.
- Use trees to classify and search medical records efficiently.

- Implement hash maps for efficient storage and retrieval of

movie details.

- Design and implement user review and rating systems.

## 6. Memory Management Simulator

- **Data Structures:** Linked Lists, Arrays.
- **Project Overview:** Simulate memory allocation and deallocation in an operating system.
- **Tasks:**
  - Use linked lists to simulate free and allocated memory blocks.
  - Implement algorithms for memory allocation (e.g., first fit, best fit).
  - Simulate fragmentation and defragmentation processes.

## 7. Flight Reservation System

- **Data Structures:** Graphs, Heaps.
- **Project Overview:** Build a system to manage flight reservations, cancellations, and route optimization.
- **Tasks:**
  - Represent flight routes using graphs.
  - Implement shortest path algorithms to find optimal routes.
  - Use heaps to manage reservation priority queues.

## 8. Chat Application with Searchable Message History

- **Data Structures:** Linked Lists, Trees (e.g., Trie for searching).
- **Project Overview:** Develop a chat application with searchable message history and user management.

- **Project Overview:** Build a system to recommend products based on user behavior and product similarity.
- **Tasks:**

- Use hash tables to store user preferences and product details.
- Implement collaborative filtering algorithms using graphs to find similar users.
- Use tree structures to organize and search products efficiently.

## 4. Real-Time Traffic Navigation System

- **Data Structures:** Graphs (for representing road networks), Priority Queues (for Dijkstra's algorithm).
- **Project Overview:** Develop a system that provides real-time navigation and traffic updates.
- **Tasks:**
  - Represent the road network as a graph with weighted edges.
  - Implement Dijkstra’s algorithm to find the shortest path.
  - Use priority queues to efficiently manage the nodes during pathfinding.
  - Integrate real-time data to update traffic conditions.

## 5. Movie Database System

- **Data Structures:** Trees (e.g., AVL Trees, Red-Black Trees), Hash Maps.
- **Project Overview:** Create a searchable movie database with features like movie ratings, reviews, and genre classification.
- **Tasks:**
  - Use trees to index movies for quick search by title, genre, or rating.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 20 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | 20 |

Part E

| | |
|---|---|
| **Books** | Seymour Lipschutz<br>R. Kruse et al. |
| **Articles** | |
| **References Books** | A M. Tenenbaum<br>E. Horowitz, S. Sahani |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 2 |
| CO2 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 2 | 1 |
| CO3 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO4 | 2 | 3 | 1 | - | - | - | - | - | - | - | - | 2 | 2 | 3 | 1 |
| CO5 | 2 | 1 | - | - | - | - | - | - | - | - | - | 2 | 3 | 2 | 2 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | PHP |
| **Course Code** | MCA-106[P] |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 1st | **Credits** | L | T | P | C |
| | | | | | 0 | 0 | 3 | 3 |
| **Course Type** | Lab only | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various syntax rules of any of programming language such as c/C++**(BL1-Remember)**<br>**CO2-** To understand Object Oriented concepts of PHP and various web development concepts including design a web, Execution of web pages on server and request handling and response. Generation.**(BL2-Understand)**<br>**CO3-** To implement Html, PHP and java script for Programming and mysql for database connectivity and file system.**(BL3-Apply)**<br>**CO4-** To analyze various Database error Handling techniques to learn how to improve the performance of the PHP application.**(BL4-Analyze)**<br>**CO5-** To evaluate and compare various web application Development techniques using PHP concepts.**(BL5-Evaluate)**<br>**CO6-** To develop solutions for real world problems using php and mysql programming.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | ntroducing PHP – history and Basic development Concepts, PHP delimiters, creating user defined variables, data types with php, type casting – Creating first PHP Scripts ,declaring and using constants, Using Variable and Operators ,– Storing Data in variable -Setting and Checking variables Data types, comments with php, useful readymade function of php. Controlling Program Flow: making decision with if, else and switch-writing More Complex Conditional Statements – Repeating Action with Loops and super global variables. | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 8 |
| 2 | Use of html for web design-, html scripts and form elements, embedding php with html ,redirecting web pages, adding dynamic contents, Working with Numeric Functions. Working with Arrays: Storing Data in Arrays –Numerically index array, associative and multi-decisional, array Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions, Array sorting, converting array to scalar variables – Working with Dates and Times. | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 8 |
| 3 | Introduction to file system- file system and uses, saving program data for later using for file system, opening a file, creating and writing to a file closing a file and deletion operation on file, reading data from a file, file handling functions. Processing Directories. String Handling: formatting strings, joining and splitting a string comparing strings matching and replacing substrings, string functions, introduction of php regular expression. Exception Handling: exception handling structure, try…catch…throw | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 8 |
| 4 | Using php Functions and Classes: Introduction to functions. Creating User defined Functions-using parameters, returning values, calling by values versus calling by reference, use of include () and require () functions. Creating php Classes – Using Advanced OOP Concept, creating a php class, object and methods, operations, class attributes, class method invocation, php static hinting, object cloning, inheritance, final keyword, php abstract class and interface. | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 8 |
| 5 | Working with Database : working on MYSQL database, connection php with mysql, creating database tables ,implementing insert delete, update and select query using php script, Session Handling: understanding basic session theory, setting cookies with php, starting a session, registration of session variables, accessing parameter using sessions, destroying variable and session. | Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab | 10 |

# PBL TOPICS

## PHP

1. **Simple CMS (Content Management System):**
- Build a basic CMS using PHP where users can create, edit, delete, and manage content (e.g., articles, blog posts).
- Include features like user authentication, role-based access control, and a WYSIWYG editor for content creation.

2. **Online Quiz System:**
- Develop an online quiz application where users can take quizzes on various topics.
- Implement features such as user registration, quiz creation, multiple-choice questions, scoring, and result display.

3. **Online Task Management System:**
- Create a task management application where users can create tasks, assign them to others, set deadlines, and track progress.
- Include features like user authentication, task categorization, priority levels, and status updates.

4. **E-commerce Website:**
- Build a simple e-commerce platform using PHP where users can browse products, add them to cart, and make purchases.
- Implement features like user registration, product catalog, shopping cart functionality, and payment integration (e.g., PayPal).

5. **OnlineStudent Information System:**
- Develop a student information system for managing student records, course details, grades, and attendance.
- Include features such as user authentication, student enrolment, course registration, and grade management.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| | | | | | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | VIKRAM VASWANI PHP A Beginner's Guide Tata McGraw Hill |
| **Articles** | Steven Holzner The PHP Complete Reference – Tata McGraw Hill |
| **References Books** | Lynn Beighley (Author), Michael Morrison (Author) Head Fist PHP & MySQL: A Brain- Friendly Guide O'Reilly Publication |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | 2 | 3 |
| CO2 | 1 | 3 | - | 1 | - | - | - | - | - | - | - | - | 2 | 1 | 2 |
| CO3 | - | - | 2 | 1 | - | - | - | - | - | - | - | - | 3 | 2 | 1 |
| CO4 | 1 | 2 | - | 2 | - | - | - | - | - | - | - | - | 2 | 2 | 1 |
| CO5 | - | 2 | 1 | 1 | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| CO6 | - | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 1 | 1 |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Database Management System |
| **Course Code** | MCA-201 (T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 2 | 6 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Student should be aware of the functioning of Application software and how information technology helps in providing information by processing Data. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember Relational database management system, database modeling, normalization, transaction management, SQL queries and PLSQL operation**(BL1-Remember)**<br>**CO2-** Understand: Understand the need of DBMS and basic concepts of DBMS, various models and techniques of designing DBMS , Database languages (Knowledge, Understand)**(BL2-Understand)**<br>**CO3-** Apply: Apply the principles of designing DBMS and apply it to design data bases for real time applications.**(BL3-Apply)**<br>**CO4-** Analyze the quality of database using normalization techniques, conflict scenarios using concurrent processing techniques, analyze various transaction serialization scenario**(BL4-Analyze)**<br>**CO5-** Evaluation of the performance of a database created for deadlocks and concurrency control.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| Unit-1 | Introduction:- Purpose of Database Systems, Views of data, Data Models, Database language, Transaction Management, Storage Management, Database Administrator, Database Users, Overall System Structure, Different types of Database Systems E-R Model: Basic Concepts, Design Issues, Mapping Constraints, Keys, E-R Diagram, Weak Entity set, Extended E-R features, Design of an E-R Database Schema, Reduction of an E-R schema to Tables. | Lectures with whiteboard/PPT,PBL | 10 |
| Unit-2 | Relational Model: Structure of Relational Database, The Relational Algebra, The tuple relational calculus, The Domain Relational Calculus, Views SQL- Background, Basic Structure, SET operations, Aggregate functions, Null Values, Nested Sub queries, Derived Relations, Views, Modification of Database, Joined Relations, DDL, Other SQL features. | Lectures with whiteboard/PPT,PBL | 8 |
| Unit-3 | Relational Database Design- Pitfalls in Relational-Database Design, Decomposition, Normalization Using Functional Dependencies, and Normalization Using Multi valued Dependencies, Normalization Using Join Dependencies, Domain- Key Normal Form and Alternative Approaches to Database Design. | Lectures with whiteboard/PPT,PBL | 10 |
| Unit-4 | Transaction- Transaction Concepts, State, Implementations of Atomicity and durability, Concurrent Executions, Serializability, Recoverability, Transaction Definition in SQL. | Lectures with whiteboard/PPT,PBL | 9 |
| Unit-5 | Concurrency Control- Lock based protocol, Timestamp based protocol, Validation based protocol, Multiple Granularity, Multi version Schemes, Deadlock Handing, Insert and Delete operations, Concurrency in index structure Query Optimization. | Lectures with whiteboard/PPT,PBL | 8 |

Part C


Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Korth, H.F., & Silberschatz, A.Database Concepts (4th ed.). McGraw Hill. |
| **Articles** | |
| **References Books** | Elmasri, R., Navathe, S., & Benjamin Cumming. Fundamentals of Database Systems (7th ed.). Pearson Education India. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | - | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 3 | 3 | 1 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | - | 3 |
| CO3 | 2 | 2 | 1 | - | 2 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO5 | 1 | 2 | - | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Computer Graphics |
| **Course Code** | MCA-202(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Prerequisite: Basic understanding of computer fundamentals, programming in 'C', and mathematical concepts. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the various concepts of computer fundamentals.**(BL1-Remember)**<br>**CO2-** To understand the Basic concept of Computer Graphics and Multimedia System**(BL2-Understand)**<br>**CO3-** To implement various algorithms in C/C++ like DDA, Circle drawing etc.**(BL3-Apply)**<br>**CO4-** : To analyze functioning of different computer graphics algorithms and various transformation techniques**(BL4-Analyze)**<br>**CO5-** To evaluate the performance characteristics of various computer graphics algorithms.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| unit-1 | Introduction to Computer Graphics Computer Graphics introduction, Types of Computer Graphics, Application areas of Computer Graphics. Overview of Graphics System: Pixels, Frame Buffer, Display Controller, Lookup Table, Resolution, Aspect Ratio, Persistence, CRT, DVST. Raster and Random Scan Displays: Raster Scan Display, Random Scan Display. Color CRT Monitors: Beam Penetration CRT, Shadow Mask CRT. | Lecturing | 9 |
| Unit-2 | Output Primitives Scan Conversion and its Side effects, Output Primitives: Points and Lines. Line Drawing Algorithms: DDA Algorithm, Bresenhem's Line Drawing Algorithm. Circle drawing Algorithms: Properties of Circle, Bresenham's Circle Drawing Algorithm, Mid-Point Circle Drawing Algorithm | Lecturing | 9 |
| Unit-3 | Transformations 2D Geometrical Transformations: Translation, Rotation, Scaling, Shearing. Homogeneous Coordinates, Composite Transformations. Reflection. 3D Geometrical Transformations: Translation, Rotation, Scaling, and Reflection. 2D Windowing and Clipping: Window, Viewport, WCS, NDCS, Window to Viewport Coordinate Transformation. Line Clipping: Cohen Sutherland Algorithm, Midpoint Subdivision Algorithm. Polygon Clipping: types of polygons, Sutherland Hodgeman Polygon Clipping | experiment | 9 |
| Unit-4 | Projection and Curves Projection: Parallel and Perspective. 3D Object Representation: Bezier and B-spline Curve. Color Models like RGB, CMY, YIQ, HSV and HLS. | experiment | 9 |
| Unit-5 | Multimedia Multimedia: Introduction, Multimedia Components, Applications, File Formats – RTF, TIFF, MIDI, JPEG, DIB, MPEG. Animation: Introduction, Rules, Different Animation Techniques Recorded video/interactive videos | experiment | 9 |

# Experiment List of Computer Graphics

1.Write a program to implement DDA line drawing algorithm

2.Write a program to implement Bresenham's line drawing algorithm

3.Write a program to implement Bresenham's circle drawing algorithm.

4.Write a program to draw an ellipse using Bresenham's algorithm.

5.Write a program to perform various transformations on line , square & rectangle.

6.Write a program to implement Cohen Sutherland line clipping algorithm.

7.Write a program to implement Liang-Bersky line clipping algorithm.

8.Write a program to implement Cohen-Sutheland polygon clipping algorithm to clip a polygon with a Pattern.

9.Write a program to convert a color given in RGB space to it's equivalent CMY color space.

10.Study of various Multimedia file formats:-RTF,MIDI,GIF,JPEG,MPEG,TIFF etc.

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Computer Graphics Donald Hearn, M.P. Baker |
| **Articles** | |
| **References Books** | Procedural Elements for Computer Graphics David F. Rogers |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | 2 | - | - | 2 | 2 | - | - | - | 2 | - | - | - | - | - |
| CO2 | 1 | 3 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | - | - | - |
| CO3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - |
| CO4 | - | - | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| CO5 | - | 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

**MCA**

| | |
|---|---|
| **Title of the Course** | Design and Analysis of Algorithms |
| **Course Code** | MCA-203 |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 1st | **Semester** | 2nd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Core | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of data, Information, Data Structures, Algorithms, and Algorithm Complexity | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember various concepts of data structures and algorithms.**(BL1-Remember)**<br>**CO2-** To understand Basic concepts of algorithm representation techniques such as Pseudo codes and Flowcharts and analysis of the algorithm.**(BL2-Understand)**<br>**CO3-** To Solve various problems based on the Divide and Conquer approach, Greedy approach, Backtracking, and Dynamic programming approach.**(BL3-Apply)**<br>**CO4-** To illustrate various types of algorithmic approaches and problems based on them such as Strassen's matrix multiplication, Multistage graph, n- queens problem, minimum spanning tree problem, etc.**(BL4-Analyze)**<br>**CO5-** To describe the performance of various algorithms using various complexity measuring techniques.**(BL5-Evaluate)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introductions and Fundamentals: Algorithms and their characteristics, models of computation, time space complexities, asymptotic analysis, average and worst case analysis. | Lecturing | 10 |
| 2 | Divide and Conquer: Control Abstraction of divide-and-conquer, examples: Binary-search, quick sort, Strassen's matrix Multiplication; Analysis of divide and conquer, run time, recurrence relations, Substitution method, Master Theorem | Lecturing | 10 |
| 3 | Dynamic programming: Overview, difference between dynamic programming and divide and conquer, Applications: Multistage graph, Shortest path in graph, Traveling salesman Problem. Greedy Method: Overview of the greedy paradigm, exact optimization solution (minimum cost spanning tree), Approximate solution (Knapsack problem), Single source shortest paths. | Lecturing | 8 |
| 4 | Backtracking: Overview, Sum of subset problem, Queen problem, and 0/1 Knapsack problem. Branch and bound: LC searching Bounding, application: 8 and 15 Puzzle Problems, 0/1 Knapsack problem, Traveling Salesman Problem | Lecturing, PBL | 8 |
| 5 | Computational Complexity: Complexity measures, Polynomial Vs non-polynomial time complexity; NP- and NP-complete classes, examples. Introduction to NP Completeness: The class P and NP, NP Completeness Problems, NP Hard Problems. | Lecturing | 9 |

Part C

# Design & Analysis of Algorithms PBL List

**Guidelines for PBL:**

1. PBL will be of 30 marks. 20 marks for Implementation and report submission and 10 marks for final presentation and viva-voce.
2. This is group activity. Each group will have maximum 05 students.
3. PBL synopsis will be submitted for approval and must be approved before going to start the work.
4. PBL report and implementation code will be submitted for final evaluation.
5. Students must showcase their implemented work of PBL and give the Final viva through the PPT.

**PBL 1:**

**Sudoku**

In this game, the user has to put a number between 1-9 in one of the cells, however, the same number cannot appear twice in the same row, column, and 3x3 grid as well.

To implement this game, we can use a grid (2D array) for the game board and **backtracking** for the logic. By using this approach, we can explore different possible combinations of numbers until a valid solution is found.

- Project title: **Sudoku**
- Algorithms/DS involved: backtracking, 2D array

**PBL 2:**

**To-Do List**

This project idea is great for beginner developers because here, we can also implement CRUD (Read-Create-Update-Delete) operations as well.

One of the ways to create a to-do list is using a **stack** data structure. This data structure follows the LIFO (last in - first out) method, so when we add a new task in our list, it will be on the top of the older tasks. For example, when removing a task, let's say we have task 1 (bottom), 2 (middle) and 3 (top) and we want to remove task 2, then task 3 will now be on top of task 1, so the order of their addition will remain.

- Project title: **To-Do list**
- Algorithms/DS involved: stack

**PBL 3:**

**Social Media Network**

If you want to create a social media network project or something similar to this, then the best approach would be to use **graphs**. Each person would represent a **node** (vertex) and the relationships between them would be represented as **edges**. This relationship between them can be friendships, follows, likes, or comments.

- Project title: **Social Media Network**
- Algorithms/DS involved: graph

**PBL 4:**

**Library Management System**

A library management system helps libraries manage and organize their resources (books, newspapers). To implement this type of project, we can use a **hash table** where we can represent the books and their information with key-value pairs. With this data structure, we can efficiently store and retrieve the key-value pairs and reduce the time complexity compared to other data structures.

- Project title: **Library Management System**
- Algorithms/DS involved: hash table

**PBL 5:**

**Maze**

There are many ways to create maze games, we can create a maze generator only (which just generates the maze) or we can create a fully functional maze game where we can control a *sprite* for example to navigate through the maze.

To create the maze itself we can use a **graph** and for the maze navigation (to find the shortest path from the entrance to the exit) we can use the **breadth-first search** (BFS) algorithm. While using this algorithm, we can keep track of the parent node of each visited node. This allows us to reconstruct the path from the exit back to the entrance once the destination is reached.

- Project title: **Maze**
- Algorithms/DS involved: graph, breadth-first search (BFS)

**PBL 6:**

**Student Grade Checker**

A student grade checker project could use a **hash table** to store and retrieve student grades efficiently. Since this data structure stores key-value pairs, the keys could be the student's name or ID and then the value could be the grades. We could also implement functions to insert or delete grades from the table.

- Project title: **Student Grade Checker**
- Algorithms/DS involved: hash table

**PBL 7:**

**Flight Route Planner**

A flight route planner project determines the most efficient routes for flights between different airports. Using **graphs** in this project is really helpful, the airports could be represented as nodes and the flights between them could be represented as edges (the connections between the nodes).

- Project title: **Flight Route Planner**
- Algorithms/DS involved: graph

**PBL 8:**

**Web Crawler**

Web crawlers explore the internet and gather information from websites. It starts with a URL then it follows the links from the page to visit other pages. Here, we can use a **queue** data structure to store the visited websites. The easiest algorithm to use would be **breadth-first search** so that the crawler visits all the links from the current website first before moving on to other websites.

- Project title: **Web Crawler**
- Algorithms/DS involved: queue, breadth-first search (BFS)

**PBL 9:**

**File Compression Tool**

A **heap** can be used to optimize the compression process. A heap is a data structure that allows efficient retrieval of the smallest/largest element in a collection. In this case, a heap can be used to store and manage frequency counts of characters in the input file.

- Project title: **File Compression Tool**
- Algorithms/DS involved: heap

**PBL 10:**

**Real-Time Traffic Analysis**

With this project we can analyze and monitor traffic data in real time. The data can be collected from sensors, cameras, or GPS devices. **Segment trees** can be used to efficiently process and analyze traffic data. Once the data is collected and stored in the segment trees, we can make queries to retrieve information (for example, the average speed at a certain time interval).

- Project title: **Real-Time Traffic Analysis**
- Algorithms/DS involved: segment tree

**PBL 11:**

**Shopping Cart App**

It's quite easy to implement a shopping cart app with **arrays**. The shopping cart acts as a temporary container for the items that users want to purchase.

- Project title: **Shopping Cart App**
- Algorithms/DS involved: array

**PBL 12:**

**Word Frequency Counter**

With this project we can count the frequency of each word in a text. We can use a **hash table** to efficiently store and retrieve the key-value pairs. First, we would split the words into tokens (for example, split it with whitespace), then we can iterate over them and for each token we can compute a hash value using a hash function. If the token already exists in the table, then we can increment the frequency value by one.

- Project title: **Word Frequency Counter**
- Algorithms/DS involved: hash table

**PBL 13:**

**Online Bookstore**

Using a **binary search tree (BST)** for this bookstore app, we can efficiently handle operations like searching, inserting, deleting, and updating books. The books will be stored in a binary search tree based on a specific key (for example, book title). Each node could represent a book and contains information of the book (title, author, etc).

- Project title: **Online Bookstore**

- Algorithms/DS involved: binary search tree (BST)

**PBL 14:**

**Decision Support System**

A decision support system project uses decision **tree** algorithms. With decision trees we can organize the data in a tree-like structure where each **node** can represent a decision based on a feature, and each **leaf node** can represent a result.

- Project title: **Decision Support System**
- Algorithms/DS involved: tree

**PBL 15:**

**Tic-Tac-Toe**

To implement the Tic-Tac-Toe game board, we can use a **2D array** data structure **(matrix)**. Each of the cell in the matrix will represent a position on the game board. Typically, the board is a 3x3 grid. There are 2 players, one with the X and one with the O. Using the matrix, we can easily visualize and manipulate the state of the game board.

- Project title: **Tic-Tac-Toe**
- Algorithms/DS involved: 2D array/matrix

**PBL 16:**

**Memory Matching Game**

This is a fun game to play and one of the ways we can implement it is using **linked lists**. Each node would represent a card and they would have their information (the card value and a property that would indicate if the card has been flipped or not) stored in the node as well. When two cards are flipped, then we can check if they have the same values and if they have the same "flipped" property (flipped: true). If we found a match then we can remove them from the list.

- Project title: **Memory Matching Game**
- Algorithms/DS involved: linked list

**PBL 17:**

**Tower of Hanoi Puzzle**

Tower of Hanoi is a puzzle game where we have to move one disk from a peg to another peg. We can use a **stack** to store the disks. Usually, there are 3 pegs and the third one is a helper peg, so we can easily move all the stack from the starting peg to the destination peg. We can only move one disk at a time and we can't place a larger disk on top of a smaller one. For the logic, we can use a **recursive** algorithm.

- Project title: **Tower of Hanoi Puzzle**
- Algorithms/DS involved: stack, recursion

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Horowitz, E., & Sahni, S. (1978, January 1). Fundamentals of Computer Algorithms. Computer Science Press. |
| **Articles** | |
| **References Books** | Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009, July 31). Introduction to Algorithms, third edition. MIT Press. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | 2 | 2 | - | - | - | - | - | - | - | 2 | 2 | 2 |
| CO2 | 2 | 2 | 1 | 3 | 2 | - | - | - | - | - | - | - | 2 | 3 | 2 |
| CO3 | 2 | 2 | 2 | 2 | 1 | - | - | - | - | - | - | - | 3 | 3 | 3 |
| CO4 | 1 | 2 | 1 | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 1 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO6 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Data WArehousing and Mining |
| **Course Code** | MCA301 (P) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Disciplinary Major | | | | | | | |
| **Pre-Requisite/s** | Student should be familiar with Discrete Mathematics, Probability, Statistics, Data structures and basics of RDBMS. | | | **Co-Requisite/s** | Student should be familiar with Discrete Mathematics, Probability, Statistics, Data structures and basics of RDBMS. | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To remember the techniques of Data mining which help to extract the meaningful data.**(BL1-Remember)**<br>**CO2-** To understand the basics of Data warehouse, Data marts, data Preprocessing and techniques of data mining.**(BL2-Understand)**<br>**CO3-** To implement the various methods of data mining for data clustering, classification: K-means, K- Medoids etc.**(BL3-Apply)**<br>**CO4-** To analyze the concepts of data Preprocessing, Association Rule Mining, classification, clustering.**(BL4-Analyze)**<br>**CO5-** To evaluate the data mining models that run efficiently.**(BL5-Evaluate)**<br>**CO6-** To create the dominant data mining algorithms; demonstrate an appreciation of the importance of paradigms from the fields of Artificial Intelligence and Machine Learning to data mining; explore the developing areas - web mining, text mining etc**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✕<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Assignment | PBL | BL2-Understand | 15 |
| 2 | QUIZ | Experiments | BL3-Apply | 15 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | 0 |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 30 | 40 | 0 |

Part E

| | |
|---|---|
| **Books** | Data Mining Concepts and Techniques |
| **Articles** | |
| **References Books** | Data Mining – Introductory and Advanced Topics |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | 1 | - |
| CO2 | - | 1 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | - | - | - | - | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 1 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | - | 1 | 1 |
| CO6 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Machine Learning |
| **Course Code** | MCA304A(T) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | Basic understanding of Statistical Data Analysis and visualization methods, and Python Programming. | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To understand Basic concept of machine learning, various machine learning models**(BL1-Remember)**<br>**CO2-** To understand various Performance evaluation techniques of Machine Learning models. **(BL2-Understand)**<br>**CO3-** To implement various supervised, unsupervised and reinforcement machine Learning Models **(BL3-Apply)**<br>**CO4-** To train & test various machine Learning models using different domains of dataset. **(BL4-Analyze)**<br>**CO5-** To evaluate and summarize the performance of various machine learning models using statistical & visualization tools**(BL5-Evaluate)**<br>**CO6-** To create machine learning models to solve real world problems.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | | **SDG (Goals)** | SDG1(No poverty)<br>SDG2(Zero hunger)<br>SDG4(Quality education)<br>SDG8(Decent work and economic growth) | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Introduction of Machine Learning: What is Machine Learning, Need for Machine Learning, Why & When to Make Machines Learn?, Machine Learning Model, Challenges in Machines Learning, Applications of Machines Learning, Overview of various machine Learning Algorithms, Performance evaluation measures for machine learning algorithms, the curse of dimensionality, Data Feature Selection, Training Data vs. Validation Data vs. Test Data for ML Algorithms, bias-variance trade off, over fitting vs under fitting. | Lectures with whiteboard/PPT, Experiments | 9 |
| 2 | Supervised Learning-I Regression: Introduction to Regression, Types of Regression Models, Introduction to Linear Regression, Simple Linear Regression, Least square regression, Gradient Descent , Multiple Linear Regression (MLR), Regularization in Linear Regression, Ridge regression, Lasso regression, Polynomial Regression, Support Vector for Regression (SVR). | Lectures with whiteboard/PPT, Experiments | 10 |
| 3 | Supervised Learning-II Classification – Introduction to Classification, Types of Learners in Classification, Logistic Regression, K-Nearest Neighbors (K-NN), Support Vector Machine (SVM), Kernel SVM, Naive Bayes, Decision Tree Classification, Random Forest Classification. | Lectures with whiteboard/PPT, Experiments | 9 |
| 4 | Unsupervised Learning Clustering- Introduction to Clustering, Types of Clustering, Types of Clustering Algorithms, K-Means Clustering, Hierarchical Clustering, DBSCAN Clustering, Association Rule Learning: Introduction to Association Rule Learning, Types of Association Rule Learning, Apriori Algorithm, Eclat Algorithm, F-P Growth Algorithm, Applications of Association Rule Learning. | Lectures with whiteboard/PPT, Experiments | 9 |
| 5 | Reinforcement Learning: Introduction of Reinforcement Learning, Terms used in Reinforcement Learning, Key Features, Elements of Reinforcement Learning, How does Reinforcement Learning Work?, The Bellman Equation, Types of Reinforcement learning, Markov Decision Process, Reinforcement Learning Algorithms, Reinforcement Learning Applications Performance Improvement of ML Models: Performance Improvement with Ensembles, Ensemble Learning Methods, Bagging Ensemble Algorithms, Boosting Ensemble Algorithms, Voting Ensemble Algorithms. | Lectures with whiteboard/PPT, Experiments | 8 |

Part C

| Modules | Title | Indicative-ABCA/PBL/ Experiments/Field work/ Internships | Bloom's Level | Hours |
|---|---|---|---|---|
| 1 | Implementation of various performance evaluation techniques of machine learning | Experiments | BL3-Apply | 02 |
| 2 | Implementation of various regression models of machine learning | Experiments | BL3-Apply | 04 |
| 3 | Implementation of various classification models of machine learning | Experiments | BL3-Apply | 03 |
| 4 | Implementation of various clustering models of machine learning | Experiments | BL3-Apply | 03 |
| 5 | Implementation of RL, bagging and boosting models of machine learning | Experiments | BL3-Apply | 03 |
| 1-5 | Problem Based Learning for real world problems | PBL | BL6-Create | 15 |

Part D(Marks Distribution)

| **Theory** | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Andreas C. Müller, Sarah Guido.(2016).Introduction to Machine Learning with Python: A Guide for Data Scientists.1st ed.O'Reilly Media. |
| **Articles** | |
| **References Books** | Tom M. Mitchell.(2017).Machine Learning.1st ed.McGraw Hill Education.<br>Dr S. Sridhar, Dr M. Vijayalakshmi.(2021).Machine Learning.1st ed. Oxford University Press.<br>Manaranjan Pradhan, U Dinesh Kumar.(2019).Machine Learning using Python.1st ed. Wiley India. |
| **MOOC Courses** | Prof. S. Sarkar.(2023).Introduction to Machine Learning, IIT Kharagpur.https://nptel.ac.in/courses/106105152<br>Dr. Balaraman Ravindran.(2024).Introduction to Machine Learning, IIT Madras.https://nptel.ac.in/courses/106106139 |
| **Videos** | |

Course Articulation Matrix

| **COs** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 1 |
| CO2 | 1 | 2 | 1 | 2 | 2 | 2 | - | - | - | 2 | - | - | 1 | - | 3 |
| CO3 | 2 | 1 | 1 | - | 1 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| CO4 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 3 | 3 |
| CO5 | 2 | 2 | - | 2 | 1 | - | - | - | - | - | - | - | 2 | 2 | 3 |
| CO6 | 2 | 1 | 1 | 2 | 2 | - | - | - | - | 2 | - | - | 2 | 2 | 3 |

# Syllabus-2023-2024

## MCA

| | |
|---|---|
| **Title of the Course** | Data Analytics |
| **Course Code** | MCA305 (P) |

Part A

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | 2nd | **Semester** | 3rd | **Credits** | L | T | P | C |
| | | | | | 3 | 1 | 1 | 5 |
| **Course Type** | Embedded theory and lab | | | | | | | |
| **Course Category** | Discipline Electives | | | | | | | |
| **Pre-Requisite/s** | | | | **Co-Requisite/s** | | | | |
| **Course Outcomes & Bloom's Level** | **CO1-** To understand the fundamentals of Big Data.**(BL1-Remember)**<br>**CO2-** To know about the different tools for Big Data and Visualization.**(BL2-Understand)**<br>**CO3-** To explore tools and practices for big data and Visualization.**(BL3-Apply)**<br>**CO4-** To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)**<br>**CO5-** To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)**<br>**CO6-** To prepare design dashboard for presenting analytics from data.**(BL6-Create)** | | | | | | | |
| **Coures Elements** | Skill Development ✓<br>Entrepreneurship ✕<br>Employability ✓<br>Professsonal Ethics ✕<br>Gender ✕<br>Human Values ✕<br>Environment ✕ | **SDG (Goals)** | | | | | | |

Part B

| Modules | Contents | Pedagogy | Hours |
|---|---|---|---|
| 1 | Big Data: Fundamentals of Big Data, defining big data, building successful big data management architecture, big data journey Big Data Types: Structured and unstructured data types, real time and non-real time requirements. Distributed Computing: History of distributed computing, basics of distributed computing | lecturing | 9 |
| 2 | Visualization: data visualization, appropriate data visualization technique for given data, design visualizations, dashboard Operational Databases: Relational database, nonrelational database, key-value pair databases, document databases, columnar databases, graph databases, spatial databases MapReduce Fundamentals: Origin of MapReduce, map function, reduce function, putting map and reduce together, optimizing map reduce. | lecturing,Experiment | 10 |
| 3 | Data Aggregation and Group operations: Group by Mechanics, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation. Time Series Data Analytics: Date and Time Data Types and Tools, Time series Basics, date Ranges, Frequencies and Shifting, Time Zone Handling, Periods and Periods Arithmetic, Resampling and Frequency conversion, Moving Window Functions. | lecturing,Experiment | 9 |
| 4 | Hadoop: Discovering Hadoop, Hadoop distributed file system, Hadoop MapReduce, Hadoop file system, dataflow, Hadoop I/O, data integrity, compression, serialization, file-based data structure Chaining. | lecturing,Experiment | 9 |
| 5 | Introduction to Hadoop Ecosystem: Avro - Avro data types and schemas, in-memory serialization and deserialization, avro datafiles, schema resolution Pig-Comparison with databases, pig latin, user defined functions, data processing operators Hive-Running hive, comparison with traditional databases, HiveQL, tables, querying data, userdefined functions Spark: Resilient distributed datasets, shared variables, anatomy of a spark job run, executors and cluster managers, HBase: HBasics, concepts, clients, HBase vs RDBMS, Praxis ZooKeeper: ZooKeeper services, building application with ZooKeeper | PBL | 8 |

Part D(Marks Distribution)

| Theory | | | | | |
|---|---|---|---|---|---|
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 40 | 60 | 18 | 40 | |
| **Practical** | | | | | |
| **Total Marks** | **Minimum Passing Marks** | **External Evaluation** | **Min. External Evaluation** | **Internal Evaluation** | **Min. Internal Evaluation** |
| 100 | 50 | 60 | 30 | 40 | |

Part E

| | |
|---|---|
| **Books** | Big Data Fundamentals: Concepts, Drivers & Techniques (The : Prentice Hall) |
| **Articles** | |
| **References Books** | Chris Eaton, Dirk Deroos et al. , “Understanding Big data”, McGraw-Hill. |
| **MOOC Courses** | |
| **Videos** | |

Course Articulation Matrix

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - |
| CO2 | - | - | 1 | 1 | 1 | 1 | - | - | - | 1 | 1 | 1 | - | - | - |
| CO3 | - | - | 1 | - | 1 | - | 1 | - | 1 | 1 | 1 | - | - | - | - |
| CO4 | 1 | 1 | 1 | 1 | 1 | 1 | - | - | - | - | - | 1 | - | 1 | - |
| CO5 | - | - | - | - | 1 | 1 | 1 | 1 | - | 1 | - | 1 | - | 1 | - |
| CO6 | 1 | - | - | - | 1 | - | 1 | - | 1 | - | 1 | 1 | - | 1 | - |