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)** **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)** **CO3-** CO3: Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL4-Analyze)** **CO4-** CO4: Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL5-Evaluate)** **CO5-** CO5: Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG8(Decent work and economic growth) 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)** **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)** **CO3-** CO3: Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL4-Analyze)** **CO4-** CO4: Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL5-Evaluate)** **CO5-** CO5: Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG8(Decent work and economic growth) 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)** **CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design)**(BL4-Analyze)** **CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop)**(BL4-Analyze)** **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)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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)** **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)** **CO3-** CO3: Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL4-Analyze)** **CO4-** CO4: Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL5-Evaluate)** **CO5-** CO5: Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL6-Create)**								
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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)** **CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design) **(BL6-Create)** **CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop) **(BL6-Create)** **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)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG8(Decent work and economic growth) 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)** **CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design) **(BL6-Create)** **CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop) **(BL6-Create)** **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)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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

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	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)** **CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)** **CO3-** CO3: To explore tools and practices for big data and Visualization. **(BL3-Apply)** **CO4-** CO4: To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)** **CO5-** CO5: To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)** **CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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)** **CO2-** : Understand the Cryptography and Encryption techniques and the concepts of Hashing **(BL2-Understand)** **CO3-** : Apply the various Symmetric and Asymmetric Key Encryption algorithms**(BL3-Apply)** **CO4-** : Explain the various Encryption and Hashing techniques and analyze the concept of Digital Signatures, IP Security**(BL4-Analyze)** **CO5-** : Evaluating the various methods of Cryptography, Hash functions, Substitution and Transposition techniques**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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)** **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)** **CO3-** To implement the cryptography and mining to implement blockchain ledger and to implement security.**(BL3-Apply)** **CO4-** To analyze the role of miner sin blockchain. Application of blockchain in multiple areasandhowitprovidessuchaneffectivesecuremechanismofhandlingandmaintainingdataorrecords**(BL4-Analyze)** **CO5-** To evaluate the performance characteristics of blockchain in comparisontoavailabletechnologiesandwhatfeaturesofblockchainmakeitsoeffective.**(BL5-Evaluate)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) 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)** **CO3-** Apply appropriate descriptive and inferential methods to summarize data and identify associations and relationships**(BL2-Understand)** **CO4-** Apply appropriate tools and technology to collect, process, transform, summarize, and visualize data**(BL3-Apply)** **CO5-** Analyze Effectively communicate methods and findings in a variety of modes..**(BL4-Analyze)** **CO6-** Analyze categorical and/or numerical data types in a given data set**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand the basics of Data warehouse, Data marts, data preprocessing and techniques of data mining.**(BL2-Understand)** **CO3-** To implement the various methods of data mining for data clustering, classification: K-means, K- Medoids etc.**(BL3-Apply)** **CO4-** To analyze the concepts of data Preprocessing, Association Rule Mining, classification, clustering.**(BL4-Analyze)** **CO5-** To evaluate the data mining models that run efficiently.**(BL5-Evaluate)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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	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)** **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)** **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)** **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)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **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)** **CO3-** Implementation of web application employing efficient database access. **(BL3-Apply)** **CO4-** Create web pages that function using external data and analyze them.**(BL4-Analyze)** **CO5-** To develop a fully functioning website and deploy on a web server.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG8(Decent work and economic growth) 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. 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. 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	Essential of Information Technology
Course Code	CSL0101[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	Understanding the prerequisites of essential information technology (IT) involves grasping foundational concepts and skills.			**Co-Requisite/s**	Understanding the prerequisites of essential information technology (IT) involves grasping foundational concepts and skills.			
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)** **CO2-** To understand Basic concept of operating system, Performance evaluation of multiple interfaces, and installation process.**(BL2-Understand)** **CO3-** .To implement various networking concepts, topologies and remove deadlocks.**(BL3-Apply)** **CO4-** To train & test various open source software, database management software with different domains of dataset.**(BL4-Analyze)** **CO5-** To evaluate and summarize the performance of various algorithm, flowchart and SDLC models using statistical & visualization tools.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) SDG17(Partnerships for the goals)				

Part B

Modules	Contents	Pedagogy	Hours
1	Computer Basics: Basics of Computer Systems, Evolution of Computers, Computer Generations, Classification of Computers Computer Applications, Interaction between User and Computer. Hardware Components, Basic Computer Organization, Input and Output Devices (T1,T3), Central Processing Unit, System Bus Architecture, Memory or Storage Unit	Lecturing	9
2	Operating System: Introduction to Operating System, Function of Operating Systems, Working Knowledge of GUI-Based Operating System, Working with latest version of Windows. Various Operating Systems, Evaluation of Operating System, Virtual Machine, Operating Systems for Mobile, Installation of Operating System, Boot Process.	Case Study	9
3	Computer Networks and World Wide Web: Introduction to Computer Networks (LAN, MAN, WAN, PAN), Network Topologies, Ethical Issues related to Network Security Internet and World Wide Web, Internet Evolution, FTP, Electronic Mail, Search Engines(T1), Introduction to HTML, Static and Dynamic Web Pages.	PBL	9
4	Computer Software: Introduction, System Software, Application Software, Firmware, Software Installing and Uninstalling, Software Development Steps, Characteristics of good software, Usability of software, Introduction to Free and Open Source Software, Introduction to Database Management System	Lecturing	9
5	Subprograms and Blocks: Problem Solving: Flow Charts, Tracing Flow Chart, Algorithms. Fundamentals of subprograms, Scope of life time of variables, static and dynamic scope, design issues of subprograms and operations, parameter passing methods, overloaded subprograms, generic subprograms, design issues for functions user defined overloaded operators..	Lecturing	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
2	Introduction to Operating System	Case Study	BL2-Understand	10
3	Designing and Implementing Network Topologies Objective:- • To understand different types of network topologies. • To design, implement, and evaluate various network topologies. • To explore the practical applications and limitations of each topology. • To develop problem-solving and teamwork skills through collaborative projects.	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	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	Computer Fundamentals by p.k shinha Fundamentals of Computers V. Rajaraman Fundamentals of Computers Prentice Hall of India Publication
Articles	
References Books	Programming in ANSI C Working in MS-Office 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	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

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)** **CO2-** Apply and analyze the basic concept of Conditional Statements, Loops & Array. (Apply, Analyze).**(BL2-Understand)** **CO3-** Apply and analyze the basic concept of Pointer & Functions. (Apply, Analyze).**(BL3-Apply)** **CO4-** Apply and analyze the basic concept of Structure and Union &Dynamic Memory Management. (Apply, Analyze).**(BL3-Apply)** **CO5-** Understand the File Management system, Command Line Arguments and Preprocessor Introduction (Knowledge, Understand)**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕			**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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	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)** **CO2-** Applying: understand the importance of data and be able to identify the data requirements for an application;**(BL3-Apply)** **CO3-** Analyzing: have a practical experience of algorithmic design and implementation;**(BL4-Analyze)** **CO4-** Evaluating: practical experience of developing applications that utilize data structures and evaluating the performances of applications;**(BL5-Evaluate)** **CO5-** Creating: develop projects requiring the implementation of various data structures**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) 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. 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. 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)** **CO2-** Apply the various SDLC, ER, DFD models, to collect SRS, And understand the software. (Apply).**(BL3-Apply)** **CO3-** Design the Design Strategies, Architectural Design concept for better development of software (Design).**(BL6-Create)** **CO4-** Explain various testing techniques and Analyze the concept of testing strategies (Analysis)**(BL4-Analyze)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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)** **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)** **CO3-** Analyze the quality of the database using normalization techniques, conflict scenarios using concurrent processing techniques, and analyze various transaction serialization scenarios**(BL3-Apply)** **CO4-** Evaluate and improve the database design by applying normalization, key constraints, and other constraints.**(BL4-Analyze)** **CO5-** Design a real database application using Database Management approaches**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) 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	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)** **CO2-** understand**(BL2-Understand)** **CO3-** Analyze**(BL4-Analyze)** **CO4-** Evaluate**(BL5-Evaluate)** **CO5-** Create**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG8(Decent work and economic growth) 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

M

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)** **CO2-** To understand Basic concepts of algorithm representation techniques such as Pseudo codes and Flowcharts and analysis of the algorithm**(BL2-Understand)** **CO3-** To solve various algorithmic problems using different techniques.**(BL3-Apply)** **CO4-** To compare various types of algorithmic approaches used to solve a problem.**(BL4-Analyze)** **CO5-** To select the correct algorithm for correct problem.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand various Performance evaluation techniques of Machine Learning models. **(BL2-Understand)** **CO3-** To implement various supervised, unsupervised and reinforcement machine Learning Models **(BL3-Apply)** **CO4-** To train & test various machine Learning models using different domains of dataset. **(BL4-Analyze)** **CO5-** To evaluate and summarize the performance of various machine learning models using statistical & visualization tools**(BL5-Evaluate)** **CO6-** To create machine learning models to solve real world problems.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) 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. Dr S. Sridhar, Dr M. Vijayalakshmi.(2021).Machine Learning.1st ed. Oxford University Press. 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

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)** **CO2-** CO2: To understand the Basic concept of project management, Dimensions of Project Monitoring and Control. **(BL2-Understand)** **CO3-** CO3: To apply various project management concepts, work breakdown structure and its life cycle and Scheduling methods**(BL3-Apply)** **CO4-** CO4: To analyze the various dimensions of Project Monitoring and Control, Error tracking and testing approaches.**(BL4-Analyze)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	Communication Skills & Colloquim
Course Code	HUL0101[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	Students should have language proficiency and a educational background.			**Co-Requisite/s**	1. Communication skills 2. Conflicts Resolution Seminar			
Course Outcomes & Bloom's Level	**CO1-** Determine interpersonal skills and be an effective goal-oriented team player.**(BL1-Remember)** **CO2-** Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct.□**(BL2-Understand)** **CO3-** Examine attitudes, emotional intelligence and understand its influence on behavior.**(BL3-Apply)** **CO4-** Justify approaches to conflict resolution.**(BL4-Analyze)** **CO5-** Evaluate the significance of formal communication**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG5(Gender equality) SDG8(Decent work and economic growth)				

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, Videoes	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 Programs, 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	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	Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi
Articles	https://www.jetir.org/papers/JETIR2108373.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	-	-	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-ComputerScience

Title of the Course	Personality Development & Communication Skills
Course Code	HUL0401[T]

Part A

Year	2nd	**Semester**	4th	**Credits**	L	T	P	C
					2	0	1	3
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	1.Basic Language Proficiency 2.Educational Background 3.Motivation			**Co-Requisite/s**	1.Communication Skills. 2.Leadership Development 3. Career Development			
Course Outcomes & Bloom's Level	**CO1-** To understand the concept, process and importance of communication.**(BL1-Remember)** **CO2-** To gain knowledge of media of communication.**(BL2-Understand)** **CO3-** To develop skills of effective communication both written and oral.**(BL3-Apply)** **CO4-** To help students to acquaint with application of communication skills in the world of business.**(BL4-Analyze)** **CO5-** To understand the concept of personality and personality development and its significance.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
Module 1	Introduction to Communication Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of Good Communication – Communication Barriers – Overcoming Communication Barriers – Cross Cultural Communication.	Audio/Video clips, group discussion, lecture with ppt, quiz	8
Module 2	(a) Written Communication Need and functions of business letters – Planning and layout of business letters – Essentials of effective correspondence – Advantages and limitations of written communication. (b) Oral Communication Meaning, nature and scope – Principles of Effective Oral Communication – Techniques of Effective Speech – The Art of Listening – Principles of Good Listening – Advantages and Limitations of Oral Communication. (Principles and good practices in online communication e.g. Telephonic, Internet – VOIP Voice over Internet Protocol	Audio/Video clips, group discussion, lecture with ppt, Review AnalysisAudio Video Mode	8
Module 3	Personality Development The concept of personality – Dimensions of personality – Term personality development – Significance.	Classroom Lecture, PPts, Videoes	4
Module 4	Attitude and Motivation Attitude – Concept – Significance – Factors affecting attitudes – Positive attitude –Advantages – Negative attitude – Disadvantages – Ways to develop positive attitude − Difference between Personalities having Positive and Negative Attitude – Concept ofmotivation – Significance – Internal and external motives – Importance of self-motivation – Factors leading to demotivation.	Audio/Video clips, group discussion,lecture with ppt, quiz	6
Module 5	Term self-esteem – Symptoms – Advantages – Do's and Don'ts to develop positive self esteem – Low self-esteem – Symptoms – Personality having low self-esteem – Positive and negative self-esteem.	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
1-2	Assignment	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**
100	50	60	30	60	

Part E

Books	Business English, 2008, Pearson Publication. Fluency in English - Part II, 2006, Oxford University Press.
Articles	https://www.bharathuniv.ac.in/colleges1/downloads/courseware_ece/notes/BSS201%20-%20PERSONALITY.pdf https://managementstudyguide.com/personality-development-articles.htm
References Books	Language, Literature and Creativity, 2013, Orient Blackswan. John E Warriner, Harcourt, Brace, Jovanovich, Warriner's English Grammar and Composition: Complete Course, 1973.
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=fehaZ0wzROI https://www.youtube.com/watch?v=sWteTJ46qzI

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	2	-	-	3	-	-	-	-	2	1	-
CO2	2	3	-	-	-	-	-	-	1	-	-	-	-	-	3
CO3	2	-	3	-	-	-	-	-	-	-	-	-	2	3	-
CO4	2	1	3	-	3	-	-	-	3	-	-	-	1	-	3
CO5	3	-	3	-	-	-	-	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)** **CO2-** To Understand the Basic concept of operating system, working of MS PowerPoint software and working of MS PowerPoint software .**(BL2-Understand)** **CO3-** To Apply concept to identify type of software, Create formula using MS Excel Tool**(BL3-Apply)** **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)** **CO5-** To evaluate and summarize the performance of various operating system, graphs and tables created in Microsoft Excel , equations and sample calculations .**(BL5-Evaluate)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand the basics characteristic's & crisis of software and process of software engineering systems**(BL2-Understand)** **CO3-** To implement various SDLC, ER, DFD models, to collect SRS, And understand the software.**(BL3-Apply)** **CO4-** To Analyze various various testing techniques and the concept of testing strategies**(BL4-Analyze)** **CO5-** To evaluate the the need of Software Maintenance and Software Project Management Software **(BL5-Evaluate)** **CO6-** To create the various Design Strategies, Architectural Design concept for better development of software.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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	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)** **CO2-** To understand the storage techniques, concepts of data center, data center infrastructure management and services. **(BL2-Understand)** **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)** **CO4-** To analyze the functionality of data center or storage infrastructure as per policies. **(BL4-Analyze)** **CO5-** To evaluate the performance of data center or storage infrastructure on various performance parameters. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) 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. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi; Mastering Cloud Computing, Elsevier 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. 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	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)** **CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)** **CO3-** CO3: To explore tools and practices for big data and Visualization.**(BL3-Apply)** **CO4-** CO4: To recognize the role of business intelligence and visualization in decision making. **(BL4-Analyze)** **CO5-** CO5: To analyze data using Power BI, Tableau etc. **(BL5-Evaluate)** **CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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.

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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	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)** **CO2-** To understand the basics of Data warehouse, Data marts, data preprocessing and techniques of data mining.**(BL2-Understand)** **CO3-** To implement the various methods of data mining for data clustering, classification: K-means, K- Medoids etc.**(BL3-Apply)** **CO4-** To analyze the concepts of data Preprocessing, Association Rule Mining, classification, clustering.**(BL4-Analyze)** **CO5-** To evaluate the data mining models that run efficiently.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) 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	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)** **CO2-** To understand various Performance evaluation techniques of Machine Learning models. **(BL2-Understand)** **CO3-** To implement various supervised, unsupervised and reinforcement machine Learning Models **(BL3-Apply)** **CO4-** To train & test various machine Learning models using different domains of dataset. **(BL4-Analyze)** **CO5-** To evaluate and summarize the performance of various machine learning models using statistical & visualization tools**(BL5-Evaluate)** **CO6-** To create machine learning models to solve real world problems.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) 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. Dr S. Sridhar, Dr M. Vijayalakshmi.(2021).Machine Learning.1st ed. Oxford University Press. 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	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)** **CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)** **CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)** **CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) 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)** **CO2-** Scholars will analyze and evaluate principles of research design, critically assessing the appropriateness of different methodologies for specific research questions. **(BL2-Understand)** **CO3-** Scholars will apply research methods to formulate hypotheses and research questions, integrating theoretical frameworks and empirical evidence. **(BL3-Apply)** **CO4-** Scholars will critically assess different techniques of data collection, selecting and justifying appropriate methods for their research projects. **(BL4-Analyze)** **CO5-** Scholars will interpret and analyze research findings using appropriate statistical and qualitative analysis techniques, drawing meaningful conclusions from the data. **(BL5-Evaluate)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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. 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)** **CO2-** CO2 : locate research problem areas & identify problem & plan, organize design **(BL3-Apply)** **CO3-** CO3 : Analyze research gaps **(BL4-Analyze)** **CO4-** CO4 : Develop competency to write and present research reports.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)** **CO3-** CO3: To explore tools and practices for big data and Visualization. **(BL3-Apply)** **CO4-** CO4: To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)** **CO5-** CO5: To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)** **CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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	Deep Learning
Course Code	BCA 703-A(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	Knowledge of machine learning models			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe in-depth about theories, fundamentals, and techniques in Deep learnin**(BL1-Remember)** **CO2-** Identify the on-going research in computer vision and multimedia field.**(BL2-Understand)** **CO3-** Evaluate various deep networks using performance parameters.**(BL3-Apply)** **CO4-** Design and validate deep neural network as per requirements.**(BL4-Analyze)** **CO5-** To evaluate the testing performance of deep Learning models on real world dataset**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) 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.	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	10
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	10
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

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1-2	Assignment	Experiments	BL3-Apply	4
3-4	Quiz	Experiments	BL2-Understand	1
1-5	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	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	Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press. 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. 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

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)** **CO2-** CO2: Design a novel and comprehensive software solution using appropriate programming languages, frameworks, and tools. (Design) **(BL6-Create)** **CO3-** CO3: Implement the designed solution effectively, demonstrating core functionalities and addressing potential limitations. (Develop) **(BL6-Create)** **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)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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	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	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)** **CO2-** Understand the need of DBMS and basic concepts of DBMS, various models and techniques of designing DBMS , Database languages (Knowledge, Understand)**(BL2-Understand)** **CO3-** Apply: Apply the principles of designing DBMS and apply it to design data bases for real time applications. (Apply).**(BL3-Apply)** **CO4-** Analyze: Analyze the quality of database using normalization techniques, conflict scenarios using concurrent processing techniques, analyze various transaction serialization scenario (Analyze)**(BL4-Analyze)** **CO5-** Evaluating: Evaluation of the performance of a database created for deadlocks and concurrency control. (Investigate).**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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)

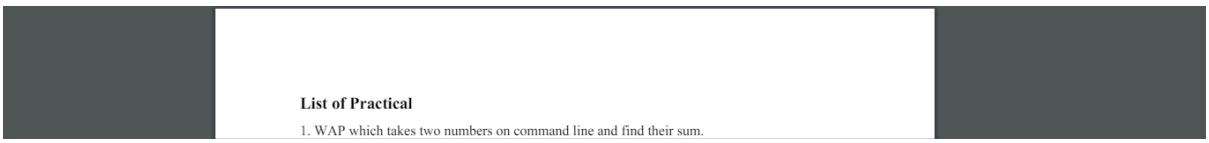
Part A

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)** **CO2-** To understand various Object-Oriented Concepts, Exception handling, Multithreading, networking and database connectivity techniques**(BL2-Understand)** **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)** **CO4-** To analyze various Error ,and Database Handling techniques to learn how to improve the performance of the java application**(BL4-Analyze)** **CO5-** To evaluate and compare various application Development techniques**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕			**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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	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)** **CO2-** To understand the basics of web architecture, Development techniques, knowledge about file system.**(BL2-Understand)** **CO3-** To implement: HTML, JavaScript and Arry, strings, database connectivity to create Web applications.**(BL3-Apply)** **CO4-** To analyze various Server-side programming techniques and OOPS Techniques**(BL4-Analyze)** **CO5-** To evaluate and improve the performance of the web application with the help of session handling Techniques**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) 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
					2	0	2	4
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)** **CO2-** Understand the basics of Python like python origin downloading and installing and basic concepts of python.**(BL2-Understand)** **CO3-** Apply the various conditional and looping statement and functional programming.**(BL3-Apply)** **CO4-** Explain various objects numbers and sequence in python Analyze the concept of regular expression**(BL4-Analyze)** **CO5-** Evaluate the concept of object-oriented programming for better utilization of language**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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)** **CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)** **CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)** **CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand the Basic concept of Data science, application areas and tools for data science**(BL2-Understand)** **CO3-** To implement Numpy for handling numerical data, pandas for handling data and basic and advanced visualization techniques to visualize the data. **(BL3-Apply)** **CO4-** To analyze the different domains of data, and perform cleaning and other preprocessing tasks on the data. **(BL4-Analyze)** **CO5-** To evaluate and summarize the data using statistical & visualization tools;**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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. 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	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)** **CO2-** To understand the basics of web architecture, Types of architecture, knowledge about web protocols and web development tools.**(BL2-Understand)** **CO3-** To implement: HTML, CSS, Javascript and XML web designing language to create Web pages.**(BL3-Apply)** **CO4-** To analyze various Client-side programming techniques and introduction of CSS for styling of the web page.**(BL4-Analyze)** **CO5-** To evaluate the web pages and layout with the help of Advanced CSS Techniques**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG10(Reduced inequalities) SDG12(Responsible consuption and production) SDG13(Climate action) SDG14(Life below water) 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

M

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)** **CO2-** To understand Object Oriented concepts for Android and various mobile application development concepts including interface designing, handling multiple activities**(BL2-Understand)** **CO3-** To implement XML, Java and mysql for database connectivity and file system**(BL3-Apply)** **CO4-** To analyze various widgets and learn to use them as per the problem**(BL4-Analyze)** **CO5-** To develop solutions for real world problems using android application development**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) 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)** **CO2-** Understand the basics of Python like python origin downloading and installing and basic concepts of python.**(BL2-Understand)** **CO3-** Apply the various conditional and looping statement and functional programming.**(BL3-Apply)** **CO4-** Explain various objects numbers and sequence in python Analyze the concept of regular expression**(BL4-Analyze)** **CO5-** Evaluate the concept of object-oriented programming for better utilization of language**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) 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. 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. 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)** **CO2-** Tounderstandthe basics characterstics&crisis of software and process of software engineering systems**(BL2-Understand)** **CO3-** To implement various SDLC, ER, DFD models, to collect SRS, And understand the software.**(BL3-Apply)** **CO4-** ToAnalyze various various testing techniquesand the concept of testing strategies**(BL4-Analyze)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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)** **CO2-** To understand the Basic concept of Data science, application areas and tools for data science**(BL2-Understand)** **CO3-** To implement Numpy for handling numerical data, pandas for handling data and basic and advanced visualization techniques to visualize the data. **(BL3-Apply)** **CO4-** To analyze the different domains of data, and perform cleaning and other preprocessing tasks on the data. **(BL4-Analyze)** **CO5-** To evaluate and summarize the data using statistical & visualization tools;**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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. 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)** **CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)** **CO3-** CO3: To explore tools and practices for big data and Visualization. **(BL3-Apply)** **CO4-** CO4: To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)** **CO5-** CO5: To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)** **CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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)** **CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)** **CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)** **CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** CO2: To understand the basics of web architecture, Types of architecture, knowledge about web protocols and web development concepts of PHP**(BL2-Understand)** **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)** **CO4-** CO4: To analyze various Client-side programming techniques**(BL4-Analyze)** **CO5-** CO5: To evaluate the web pages and layout with the help of Advanced CSS Techniques **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **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)** **CO3-** To implement the cryptography and mining to implement blockchain ledger and to implement security.**(BL3-Apply)** **CO4-** To analyze the role of miner sin blockchain. Application of blockchain in multiple areasandhowitprovidessuchaneffectivesecuremechanismofhandlingandmaintainingdataorrecords**(BL4-Analyze)** **CO5-** To evaluate the performance characteristics of blockchain in comparisontoavailabletechnologiesandwhatfeaturesofblockchainmakeitsoeffective.**(BL5-Evaluate)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) 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	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)** **CO2-** CO2: To know about the different tools for Big Data and Visualization.**(BL2-Understand)** **CO3-** CO3: To explore tools and practices for big data and Visualization.**(BL3-Apply)** **CO4-** CO4: To recognize the role of business intelligence and visualization in decision making. **(BL4-Analyze)** **CO5-** CO5: To analyze data using Power BI, Tableau etc. **(BL5-Evaluate)** **CO6-** CO6: To prepare design dashboard for presenting analytics from data. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	Full Stack Development
Course Code	MCA 305- C(T)

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					0	0	1	1
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)** **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)** **CO3-** Implementation of web application employing efficient database access. **(BL3-Apply)** **CO4-** Create web pages that function using external data and analyze them.**(BL4-Analyze)** **CO5-** To develop a fully functioning website and deploy on a web server.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG8(Decent work and economic growth) 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. 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. 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)** **CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)** **CO3-** CO3 : Analize the performance of the system develpoed using standard techniques for testing **(BL4-Analyze)** **CO4-** CO4 : Evaluate the performacne of the system develpoed against the performance of similar tools./ systems **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** CO2 : Aplly the core discipline knowledge and develop a complete system for the given / chosen task**(BL3-Apply)** **CO3-** CO3 : Analize the performance of the system developed using standard techniques for testing **(BL4-Analyze)** **CO4-** CO4 : Evaluate the performance of the system developed against the performance of similar tools./ systems **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) 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]

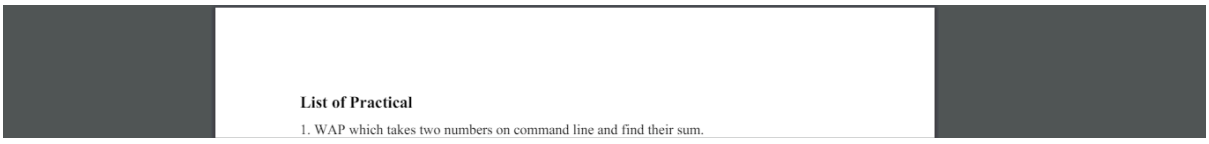
Part A

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)** **CO2-** To understand various Object-Oriented Concepts, Exception handling, Multithreading, networking and database connectivity techniques**(BL2-Understand)** **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)** **CO4-** To analyze various Error ,and Database Handling techniques to learn how to improve the performance of the java application.**(BL4-Analyze)** **CO5-** To evaluate and compare various application Development techniques**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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	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)** **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)** **CO3-** To implement Html, PHP and java script for Programming and mysql for database connectivity and file system.**(BL3-Apply)** **CO4-** To analyze various Database error Handling techniques to learn how to improve the performance of the PHP application.**(BL4-Analyze)** **CO5-** To evaluate and compare various web application Development techniques using PHP concepts.**(BL5-Evaluate)** **CO6-** To develop solutions for real world problems using php and mysql programming.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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	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)** **CO2-** To understand various Performance evaluation techniques of Machine Learning models. **(BL2-Understand)** **CO3-** To implement various supervised, unsupervised and reinforcement machine Learning Models **(BL3-Apply)** **CO4-** To train & test various machine Learning models using different domains of dataset. **(BL4-Analyze)** **CO5-** To evaluate and summarize the performance of various machine learning models using statistical & visualization tools**(BL5-Evaluate)** **CO6-** To create machine learning models to solve real world problems.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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. Dr S. Sridhar, Dr M. Vijayalakshmi.(2021).Machine Learning.1st ed. Oxford University Press. 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

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)** **CO2-** To know about the different tools for Big Data and Visualization.**(BL2-Understand)** **CO3-** To explore tools and practices for big data and Visualization.**(BL3-Apply)** **CO4-** To recognize the role of business intelligence and visualization in decision making.**(BL4-Analyze)** **CO5-** To analyze data using Power BI, Tableau etc.**(BL5-Evaluate)** **CO6-** To prepare design dashboard for presenting analytics from data.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	-

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)** **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)** **CO3-** To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ 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)** **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)** **CO3-** To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ 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)** **CO2-** To increase their mental ability.**(BL3-Apply)** **CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)** **CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **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)** **CO3-** To promote cooperation and to develop synergetic collaboration between industry and the university in promoting a knowledgeable society**(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ 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)** **CO2-** To increase their mental ability.**(BL3-Apply)** **CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)** **CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To increase their mental ability.**(BL3-Apply)** **CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)** **CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand & analyze the different irrigation engg problems.**(BL2-Understand)** **CO3-** To implement the different designing concepts of canal and well structures.**(BL3-Apply)** **CO4-** To provide experimental basis, and to enable the students to analyze the flood prediction.**(BL4-Analyze)** **CO5-** To evaluate the applications of different irrigation engg in various fields such as research & industries.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Analyze &compute different properties of Geosynthetics**(BL4-Analyze)** **CO3-** Understand the emerging trends of Geosynthetic in geotechnical applications**(BL2-Understand)** **CO4-** Design the Reinforced Earth Walls using Geosynthetic material**(BL5-Evaluate)** **CO5-** Design the Reinforced Foundation using Geosynthetic materials**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Formulate finite element models using appropriate element selection, development ofstiffness & force matrices, and application of boundary conditions**(BL3-Apply)** **CO3-** Solve structural, thermal, and dynamic problems using the developed finite element formulations**(BL4-Analyze)** **CO4-** Demonstrate the ability to create models for structural, thermal, and fluid flow applications using commercial finite element packages**(BL3-Apply)** **CO5-** Interpret the analysis results to improve product and system design**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Develop work break down structure, scheduling and project management of smart cities**(BL3-Apply)** **CO3-** Work out the most energy efficient technique for development of Smart Cities**(BL4-Analyze)** **CO4-** To understand the importance of different smart system**(BL2-Understand)** **CO5-** To understand latest technologies used in intelligent building**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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	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)** **CO2-** Students are able to understand the concept of excavation and different types of foundations.**(BL2-Understand)** **CO3-** Students are able to apply the knowledge of different foundations for construction practices.**(BL3-Apply)** **CO4-** To analyze different theories of bearing capacities and settlements regarding structures.**(BL4-Analyze)** **CO5-** Students will be able to conduct several tests and evaluate different parameters of foundation**(BL5-Evaluate)** **CO6-** To complete foundation work at a construction site.							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Analyze stress, strain and deflection by boussinesq's, bur mister's and westergaard's theory**(BL4-Analyze)** **CO3-** Design rigid pavement and flexible pavement conforming to IRC58-2002 and IRC37-2001.**(BL4-Analyze)** **CO4-** Evaluate the performance of the pavement and also develops maintenance statement based on site specific requirements**(BL5-Evaluate)** **CO5-** Understand the various causes leading to failure of pavement and remedies for the same**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** : To understand & analyze the concept of soft storeys**(BL2-Understand)** **CO3-** To implement the different designing earthquake resistant structures**(BL3-Apply)** **CO4-** : To provide experimental basis, and to enable the students to analyze and test equivalent lateral force method**(BL4-Analyze)** **CO5-** To evaluate the applications of dynamic analysis**(BL5-Evaluate)** **CO6-** : To apply the understanding of retrofitting techniques**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Apply knowledge of basic image interpretation and data image processing.**(BL3-Apply)** **CO3-** Integrate the existing data through various observations from various angles and layer creation**(BL4-Analyze)** **CO4-** Apply problem-solving methodologies to generate, evaluate and justify innovative solutions by designing and conducting/ analyzing and interpreting the data**(BL3-Apply)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Students will understand the concept of fluid kinematics**(BL2-Understand)** **CO3-** Students will analyse the type of boundary layer flows**(BL4-Analyze)** **CO4-** Students will be able to apply the fluid concepts for hydraulic structures**(BL3-Apply)** **CO5-** Students will be able to evaluate different flow conditions with different defined equations**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Analyze & compute the challenges of waste management for smart cities**(BL4-Analyze)** **CO3-** Understand the C&D Waste and E-Waste Management**(BL2-Understand)** **CO4-** Design the generation rates and waste composition material**(BL5-Evaluate)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG6(Clean water and sanitation) SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Student will be able to Apply cutting-edge construction technologies**(BL3-Apply)** **CO3-** Student will be able to Evaluate different sustainable construction methods**(BL5-Evaluate)** **CO4-** Student will be able to Apply different rating systems of construction/buildings as a professional**(BL3-Apply)** **CO5-** Student will be able to Apply life cycle approach to optimize the performance of green construction materials **(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Learn Method of Limit Analysis, applicable to beams basic theorems of limit analysis, rectangular portal frames, gable frames, grids**(BL4-Analyze)** **CO3-** Learn Limit design Principles, and method of combining**(BL5-Evaluate)** **CO4-** Calculate of Deflection in Plastic beams and frames.**(BL5-Evaluate)** **CO5-** Learn Minimum weight Design**(BL5-Evaluate)**						
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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	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 Structuresl,, 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)** **CO2-** Students will be able to detect the defects in foundation, masonry, plastering, Painting, flooring, doors and windows**(BL3-Apply)** **CO3-** Students will be able to provide preventive and remedial measures for Defects**(BL4-Analyze)** **CO4-** Students will be able to locate and place different components like Lifts, electrical panels etc.**(BL4-Analyze)** **CO5-** Students will learn the importance of Need for retrofitting and restoration **(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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

M

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)** **CO2-** To understand different types and Methods of Pre-stressing.**(BL2-Understand)** **CO3-** Students will be able to apply the knowledge of Pre-stressing on different RCC Structures.**(BL3-Apply)** **CO4-** To analyze Beam for different Profiles of Tendons.**(BL4-Analyze)** **CO5-** To evaluate the stress distribution for different zones of beams**(BL5-Evaluate)** **CO6-** To Create and design a Pre-stressed beam and understand its advantages over RCC**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand & analyze the traffic engineering problems**(BL2-Understand)** **CO3-** To implement car-following models, queuing theories, and design of traffic signals in traffic engineering.**(BL3-Apply)** **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)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Analyze & compute the energy flow in buildings**(BL4-Analyze)** **CO3-** Understand the energy efficient buildings**(BL2-Understand)** **CO4-** Design the building as per LEED India Rating System**(BL4-Analyze)** **CO5-** Design an Eco-friendly captive power generation**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Analyse the requirements of an airport layout with respect to international regulations**(BL4-Analyze)** **CO3-** Explain the airport runway design**(BL4-Analyze)** **CO4-** Design Taxiways & Aprons.**(BL3-Apply)** **CO5-** Summarise the concepts of the terminal service facilities**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** Students will be able to explain handling and processing of solid waste**(BL2-Understand)** **CO3-** Students will be able to apply the concept of landfilling for disposal of solid waste**(BL3-Apply)** **CO4-** Students will be able to design composting and other solid waste conversion units**(BL4-Analyze)** **CO5-** Students will understand the various hazardous waste, risk assessment and legislation **(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG6(Clean water and sanitation) 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)** **CO2-** Students will be able to Distinguish between the Conventional and current approaches for travel demand estimation**(BL4-Analyze)** **CO3-** Students will be able to Implement various types of models and trip generation**(BL3-Apply)** **CO4-** Students will be able to Analyze the urban travel markets**(BL4-Analyze)** **CO5-** Students will be able to Evaluate the transport planning proposals**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG8(Decent work and economic growth) 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)** **CO2-** To understand the Soil properties, Building elements, Integeration of Techniques**(BL2-Understand)** **CO3-** Students are able to apply knowledge of surveying in field**(BL3-Apply)** **CO4-** To Analyse the different Plannings of building**(BL4-Analyze)** **CO5-** To evaluate the behavior and Structural failure & constructional issues**(BL4-Analyze)** **CO6-** To Complete Determination of Layouts **(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	Structural Materials
Course Code	CEL0233[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	Basics of Civil Engineering			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Students will get knowledge of Basic Structural Materials**(BL1-Remember)** **CO2-** To understand the materials use in Civil Engineering industry**(BL2-Understand)** **CO3-** Students are able to apply the details of Innovative Textures**(BL3-Apply)** **CO4-** To analyse different Admixtures & other adhesives**(BL4-Analyze)** **CO5-** To evaluate the behavior of different Structural materials in different purposes**(BL5-Evaluate)** **CO6-** To Create adequate type of Construction material **(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	Compressive Strength of Bricks	Experiments	BL2-Understand	2
2	Water absorption of Bricks	Experiments	BL2-Understand	2
3	Initial and Final Setting time of Cement	Experiments	BL3-Apply	2
4	Efflorescence of Bricks	Experiments	BL2-Understand	2
5	Specific Gravity of Aggregate	Experiments	BL3-Apply	2
6	Fineness of Cement	Experiments	BL2-Understand	2
7	Tensile test of TOR Steel	Experiments	BL3-Apply	2
8	Soundness of Cement	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**
0	0	0	0	0	0

Part E

Books	Rangwala, Engineering Materials, Charotar Publication
Articles	
References Books	S. K, Duggal, Building Materials, New Age 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	3	3	2	2	1	1	-	2	-	2	2	3	2	2
CO2	3	3	2	2	2	-	1	-	-	-	2	2	3	3	3
CO3	2	2	2	3	1	1	-	-	2	-	-	2	2	2	1
CO4	3	2	3	2	2	-	1	-	-	-	2	1	1	2	2
CO5	2	2	2	3	1	1	-	-	2	1	2	3	1	3	3
CO6	3	2	3	2	2	1	1	-	2	1	3	2	1	1	2

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)** **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)** **CO3-** Students are able to Take the Data Concerning strength of various structural elements**(BL3-Apply)** **CO4-** To suggest suitable material from among the available in the field of construction and manufacturing**(BL4-Analyze)** **CO5-** To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts **(BL4-Analyze)** **CO6-** To Complete Determination of SFD, BMD and Deflection of Different Structural Elements**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand & analyze the different function of ingredients of concrete**(BL2-Understand)** **CO3-** To implement the different designing concrete mix design**(BL3-Apply)** **CO4-** To provide experimental basis, and to enable the students to analyze and test the concrete properties **(BL4-Analyze)** **CO5-** To evaluate the applications of different special types of concrete**(BL5-Evaluate)** **CO6-** To apply the understanding of destructive and non destructive testing of concrete**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** To introduce the knowledge of Highway Planning**(BL1-Remember)** **CO3-** Students are able to have knowledge of Highway Planning, Alignment, Construction & maintenance of roads**(BL2-Understand)** **CO4-** To knowledge of Traffic Jamming & its solutions on Highways & Minimize The numbers of road accidents**(BL2-Understand)** **CO5-** To design Highways**(BL3-Apply)** **CO6-** To be able to construct roads**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG3(Good health and well-being) SDG4(Quality education) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG14(Life below water) SDG15(Life on land) 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)** **CO2-** To introduce the knowledge of Beams and Slab Designs**(BL2-Understand)** **CO3-** Students are able to understand yield Line theory of Slabs**(BL2-Understand)** **CO4-** To analyze the concept of Soft Storey**(BL4-Analyze)** **CO5-** To Apply Codal Provision in designing methods**(BL3-Apply)** **CO6-** To be able to create different basic elements of a building**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To Understand the concept of drawing basic elements of buildings**(BL2-Understand)** **CO3-** To Analyse different techniques for different views of building**(BL4-Analyze)** **CO4-** To apply knowledge of different plans on real life building strutures**(BL3-Apply)** **CO5-** To develop plans of superstructure and substructure details of a building**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To Understand the concept of drawing basic elements of buildings**(BL2-Understand)** **CO3-** To Analyse different techniques for different views of building**(BL4-Analyze)** **CO4-** To apply knowledge of different plans on real life building strutures**(BL3-Apply)** **CO5-** To develop plans of superstructure and substructure details of a building**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** • CO2: To understand & analyze the different fluid flow problems.**(BL2-Understand)** **CO3-** • CO3: To implement the different designing concepts of fluid mechanics.**(BL3-Apply)** **CO4-** • CO4: To provide experimental basis ,and to enable the students to analyze the behaviour of various in fluids and its characterstics.**(BL4-Analyze)** **CO5-** • CO5: To evaluate the applications of fluids in various fields such as research&industries.**(BL4-Analyze)** **CO6-** • CO6: To apply the understanding of fluids in identifying the fluids and its different types.**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** • CO2:To understand & analyze the horizontal vertical & inclined measurements.**(BL2-Understand)** **CO3-** • CO3:To implement the different instrumentation techniques.**(BL3-Apply)** **CO4-** • CO4: To provide experimental basis,and to enable the studentstoanalyzetheRLs of different levels.**(BL4-Analyze)** **CO5-** • CO5:To evaluate the land areas & volume of earth work.**(BL5-Evaluate)** **CO6-** • CO6: To apply the understand inglocation of of fininte points **(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** • CO2: To understand & analyze the different geotechnical engineering problems.**(BL2-Understand)** **CO3-** • CO3: To implement the shear strength parameters, consistency limits used in geotechnical engineering.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the stress distribution in soils and stability of slopes. **(BL5-Evaluate)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** • CO2:Tounderstand & analyze the Rolling Loads.**(BL2-Understand)** **CO3-** • CO3:To implement and analyze the different theorems on Beams **(BL4-Analyze)** **CO4-** • CO4:Toanalyze the sway portal frames**(BL4-Analyze)** **CO5-** • CO5:ToevaluatetheArches and their thrust conditions.**(BL5-Evaluate)** **CO6-** • CO6:Tocreate appropriate loading conditions for different complex and indeterminate structures**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand different types of connections in steel members**(BL2-Understand)** **CO3-** To implement the knowledge of IS Code for Structural Design of Steel members**(BL3-Apply)** **CO4-** To Design different members like flexural and compression**(BL2-Understand)** **CO5-** To evaluate the different loading conditions according to different connections**(BL2-Understand)** **CO6-** To Create a Structural member fir for Different Loading Conditions**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** CO2: To understand & analyze the different fluid flow problems.**(BL2-Understand)** **CO3-** CO3: To implement the different designing concepts of fluid machines.**(BL3-Apply)** **CO4-** CO4: To provide experimental basis, and to enable the students to analyze the working of various machines and its different components.**(BL4-Analyze)** **CO5-** CO5: To evaluate the applications of fluids in various fields such as research & industries.**(BL5-Evaluate)** **CO6-** CO6: To apply the understanding of fluids in identifying the fluids and its different types.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **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)** **CO3-** CO3: Students are able to Take the Data concerning different types of Surveying Instruments.**(BL3-Apply)** **CO4-** CO4:To analyze Indeterminate structures and towers according to dynamic loading**(BL4-Analyze)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					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)** **CO2-** • CO2:To make the student familiar with latest computational techniques used for structural analysis.**(BL4-Analyze)** **CO3-** • CO3:Students are able to apply these methods for analyzing the indeterminate structures to evaluate the response of structures**(BL3-Apply)** **CO4-** • CO4:To analyze Indeterminate structures and towers according to dynamic loading**(BL4-Analyze)** **CO5-** • CO5:Students will be able to determine response of structures by classical, iterative and matrix methods**(BL5-Evaluate)** **CO6-** • CO6:To enable the student get a feeling of how real-life structures behave.**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** CO2: Students are able to understand the concept of excavation and different types of foundations.**(BL2-Understand)** **CO3-** CO3: Students are able to apply the knowledge of different foundations for construction practices.**(BL3-Apply)** **CO4-** CO4: To analyze different theories of bearing capacities and settlements regarding structures.**(BL4-Analyze)** **CO5-** CO5: Students will be able to conduct several tests and evaluate different parameters of foundation**(BL6-Create)** **CO6-** CO6: To complete foundation work at a construction site.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** To understand & analyze the different steel structures problems.**(BL2-Understand)** **CO3-** To implement the different designing concepts of steel structures**(BL3-Apply)** **CO4-** To provide experimental basis, and to enable the students to analyze the behaviour of various steel structures and its properties.**(BL4-Analyze)** **CO5-** To evaluate the applications of different steel structural members in various fields such as research & industries.**(BL5-Evaluate)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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-** Toremember thevarious concepts Steel Design.**(BL1-Remember)** **CO2-** Tounderstandthe concept of design of Multi-Storey Buildings.**(BL2-Understand)** **CO3-** To implementthe different designing concepts retaining of earth work with retaining walls.**(BL3-Apply)** **CO4-** Toprovidedifferent types of structural elements as per the requirement of structure**(BL3-Apply)** **CO5-** Todesignthe silos and bunkers**(BL5-Evaluate)** **CO6-** ToCreate different RCC Complex structures with designing**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand & analyze the different Quantity Estimates**(BL4-Analyze)** **CO3-** : To implement the different designing concepts of Quantity Estimation.**(BL5-Evaluate)** **CO4-** To provide experimental basis, and to enable the students to analyze the quantity and cost estimates.**(BL3-Apply)** **CO5-** To evaluate the applications of different Estimation and Costing in various fields such as research & industries.**(BL3-Apply)** **CO6-** : To apply the understanding of Rate Analysis in solving problem of Estimation**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand & analyze the concept of population forecasting**(BL2-Understand)** **CO3-** To provide experimental basis, and to enable the students to analyze physical, chemical and biological impurities**(BL4-Analyze)** **CO4-** To evaluate the applications of rain water harvesting**(BL5-Evaluate)** **CO5-** To apply the understanding of water treatment**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** CO2:Students are able to understand the concept Plate Girders**(BL2-Understand)** **CO3-** CO3:Students are able to apply the knowledge of different types of truss loading**(BL3-Apply)** **CO4-** CO4:To analyze different loadings on Bunkers and Silos**(BL4-Analyze)** **CO5-** CO5: Students will be able to design several complex steel structures**(BL5-Evaluate)** **CO6-** CO6:To complete Design of Water Tank.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand the resource of contract management**(BL2-Understand)** **CO3-** Students are able to Take the details of contracts & Tenders.**(BL3-Apply)** **CO4-** To adopt knowledge in construction & project management.**(BL4-Analyze)** **CO5-** To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts**(BL5-Evaluate)** **CO6-** To Complete Determination of Organisational behaviour**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 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 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)** **CO2-** Students will be able to Design track Gradients as per given requirements**(BL4-Analyze)** **CO3-** Students will be able to discuss various Types of Track Turnouts**(BL2-Understand)** **CO4-** Students will be able to describe purposes and facilities at Railway Stations**(BL3-Apply)** **CO5-** Students will be able to Explain Interlocking and modern signal system**(BL3-Apply)** **CO6-** Students will be able to Describe Surface Defects on Railway Track and Their Remedial Measures**(BL2-Understand)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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	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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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. 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. Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press 2017 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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 P.S. Gill Engineering Drawing Kataria Publication Agrawal and Agrawal Engineering Drawing TMH
Articles	
References Books	Venu Gopal K Engineering Drawing New age 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)** **CO2-** • CO2: To understand & analyze the different Rcc components along with the guidelines of Indian Standard Code IS 456-2000.**(BL3-Apply)** **CO3-** • CO3: To implement the different designing concepts of Rcc.**(BL3-Apply)** **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)** **CO5-** • CO5: To evaluate the applications of different Rcc structural members in various fields such as research & industries.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Apply the various networking concepts, topologies and remove deadlocks. (Apply).**(BL2-Understand)** **CO3-** Explain various memory management techniques and Analyze the concept of Sub-programs and blocks (Analysis)**(BL3-Apply)** **CO4-** Design the concept of software, operating system for better utilization of external system (Design)**(BL4-Analyze)** **CO5-** Evaluating the various algorithm, its solution and other communication techniques. (Investigation).**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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)** **CO2-** To understand the Basic concept of Data structure, application areas and tools for data science **(BL2-Understand)** **CO3-** Applying coding for handling logic data and algorithm for handling data from data files **(BL3-Apply)** **CO4-** Analyzing the hash function concepts of collision and its resolution methods **(BL4-Analyze)** **CO5-** To evaluate and summarize the data structure using statistical & visualization tools**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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	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)** **CO2-** Understand the basic concept of the object-oriented programming **(BL2-Understand)** **CO3-** Apply the logic of oops in java **(BL3-Apply)** **CO4-** Able to Analyze inheritance and abstraction **(BL4-Analyze)** **CO5-** Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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)** **CO2-** Understand the Basic concept of Python Programming **(BL2-Understand)** **CO3-** Apply the concept of Python in ML **(BL3-Apply)** **CO4-** Analysis the use of built-in functions to navigate the file system**(BL4-Analyze)** **CO5-** Implement and evaluate the Python code in project **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) 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 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 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)** **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)** **CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design).**(BL3-Apply)** **CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)** **CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **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)** **CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL3-Apply)** **CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)** **CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** To enhance their mental ability**(BL2-Understand)** **CO3-** To inculcate the ability to express innovative opinion and thought**(BL3-Apply)** **CO4-** To have Dissertation works as skills development in student **(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To enhance their mental ability**(BL3-Apply)** **CO3-** To inculcate the ability to express innovative opinion and thought**(BL4-Analyze)** **CO4-** To have Dissertation works as skills development in student **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Understand the flow control and error control mechanisms and apply them using standard data link layer protocols **(BL2-Understand)** **CO3-** To apply simple communication network using different topology **(BL3-Apply)** **CO4-** To analysis the network topology and circuit for communication. **(BL4-Analyze)** **CO5-** Evaluate the transport Layer Protocols (UDP, TCP) and suggest appropriate protocol in reliable/unreliable communication**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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 Stallings, W., (2007). Data and Computer Communication, Pearson Education 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/ 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	Micro Electro Mechanical System (MEMS)
Course Code	ECE0665[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-** Remember the operation of micro devices, micro systems and their applications**(BL1-Remember)** **CO2-** Understand the micro electro mechanical system concept **(BL2-Understand)** **CO3-** Apply scaling laws that are used extensively in the conceptual design of micro devices and systems Choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process **(BL3-Apply)** **CO4-** Analysis the concept of sensor, actuator and mems device **(BL4-Analyze)** **CO5-** Simplify and Evaluate the design of micro devices, micro systems using the MEMS fabrication process **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours
1	Overview of MEMS and Microsystems: MEMS and Microsystem, Typical MEMS and Microsystems Products, Evolution of Microfabrication, Microsystems and Microelectronics, Multidisciplinary Nature of Microsystems, Miniaturization. Applications and Markets.	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Working Principles of Microsystems: Introduction, Microsensors, Micro actuation, MEMS with Micro actuators, Micro accelerometers, Microfluidics. Engineering Science for Microsystems Design and Fabrication: Introduction, Molecular Theory of Matter and Inter-molecular Forces, Plasma Physics, Electrochemistry	ecture Method/ Case Study/ Video/ Group Discussion	12
3	Engineering Mechanics for Microsystems Design: Introduction, Static Bending of Thin Plates, Mechanical Vibration, Thermo mechanics, Fracture Mechanics, Thin Film Mechanics, Overview on Finite Element Stress Analysis	ecture Method/ Case Study/ Video/ Group Discussion	12
4	Scaling Laws in Miniaturization: Introduction, Scaling in Geometry, Scaling in Rigid-Body Dynamics, Scaling in Electrostatic Forces, Scaling in Fluid Mechanics, Scaling in Heat Transfer	ecture Method/ Case Study/ Video/ Group Discussion	10
5	Overview of Micromanufacturing: Introduction, Bulk Micromanufacturing, Surface Micromachining, The LIGA Process, Summary on Micromanufacturing	ecture 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) Tai-Ran Hsu, MEMS and Micro systems: Design,2nd Ed, Wiley Manufacture and Nanoscale Engineering,
Articles	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8875460/
References Books	1) Hans H. Gatzen,Volker Saile, JurgLeuthold,Micro and Nano Fabrication: Tools and Processes,Springer, 2015. 2)Dilip Kumar Bhattacharya, Brajesh Kumar Kaushik,, Microelectromechanical Systems (MEMS), Cengage Learning.
MOOC Courses	https://www-cloudfront-alias.coursera.org/learn/pressure-force-motion-humidity-sensors?specialization=embedding-sensors-motors
Videos	https://nptel.ac.in/courses/117105082

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	-	1	-
CO3	2	2	1	-	-	-	-	-	-	-	-	1	-	2	-
CO4	2	1	1	-	-	-	-	-	-	-	-	1	-	2	-
CO5	1	3	2	-	-	-	-	-	-	-	-	2	-	3	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BTech-Electronics_and_Communication

Title of the Course	Nanoelectronics
Course Code	ECE0736 [T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Basic knowledge of electronics and material science			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Know the principles behind Nanoscience engineering and Nanoelectronics.**(BL1-Remember)** **CO2-** To Understand the effect of particles size on mechanical, thermal, optical and electrical properties of nanomaterials.**(BL2-Understand)** **CO3-** Apply the knowledge to prepare and characterize nanomaterials.**(BL3-Apply)** **CO4-** Analyse the process flow required to fabricate state-of-the-art transistor technology.**(BL4-Analyze)** **CO5-** To evaluate the stability and characteristic of various types of nanoelectronics devices**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Overview of nanoscience and engineering. Development milestones in microfabrication and electronic industry. Moore's law and continued miniaturization, Classification of Nanostructures, Electronic properties of atoms and solids: Isolated atom, Bonding between atoms, Giant molecular solids, Free electron models and energy bands, crystalline solids, Periodicity of crystal lattices, Electronic conduction, effects of nanometerlength scale, Fabrication methods: Top down processes, Bottom up processes methods for templating the growth of nanomaterials, ordering of nanosystems	Lecture Method/ / Video/ Group Discussion / Case study	12
2	Characterization: Classification, Microscopic techniques, Field ion microscopy, scanning probe techniques, diffraction techniques: bulk and surface diffraction techniques (Text 1). Inorganic semiconductor nanostructures: overview of semiconductor physics. Quantum confinement in semiconductor nanostructures: quantum wells, quantum wires, quantum dots, super-lattices, band offsets, electronic density of states	Lecture Method/ / Video/ Group Discussion / Case study	10
3	Fabrication techniques: requirements of ideal semiconductor, epitaxial growth of quantum wells, lithography and etching, cleaved-edge over growth, growth of vicinal substrates, strain induced dots and wires, electrostatically induced dots and wires. Quantum well width fluctuations, thermally annealed quantum wells, semiconductor nanocrystals, collidal quantum dots, self-assembly techniques.(Text 1). Physical processes: modulation doping, quantum hall effect, resonant tunneling, charging effects, ballistic carrier transport, Inter band absorption, intraband absorption, Light emission processes, phonon bottleneck, quantum confined stark effect, nonlinear effects, coherence and dephasing, characterization of semiconductor nanostructures: optical electrical and structural	Lecture Method/ / Video/ Group Discussion / Case study	10
4	Carbon Nanostructures: Carbon molecules, Carbon Clusters, Carbon Nanotubes, application of Carbon Nanotubes.	Lecture Method/ / Video/ Group Discussion / Case study	10
5	Nanosensors: Introduction, What is Sensor and Nanosensors?, What makes them Possible?, Order From Chaos, Characterization, Perception, Nanosensors Based On Quantum Size Effects, Electrochemical Sensors, Sensors Based On Physical Properties, Nanobiosensors, Smart dust Sensor for the future. Applications: Injection lasers, quantum cascade lasers, single-photon sources, biological tagging, optical memories, coulomb blockade devices, photonic structures, QWIP's, NEMS, MEMS	Lecture Method/ / Video/ Group Discussion / Case study	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. Ed Robert Kelsall, Ian Hamley, Mark Geoghegan, —Nanoscale Science and Technologyll, John Wiley, 2007. 2. Charles P Poole, Jr, Frank J Owens, —Introduction to Nanotechnologyll, John Wiley, Copyright 2006, Reprint 2011. 3. T Pradeep, —Nano: The essentials-Understanding Nanoscience and Nanotechnologyll, TMH.
Articles	Chau, Robert, et al. "Integrated nanoelectronics for the future." Nature materials 6.11 (2007): 810-812.
References Books	Ed William A Goddard III, Donald W Brenner, Sergey E. Lyshevski, Gerald J Iafrate, —Hand Book of Nanoscience Engineering and Technologyll, CRC press, 2003.
MOOC Courses	https://archive.nptel.ac.in/courses/117/108/117108047/
Videos	https://www.youtube.com/watch?v=wdNFCWLuC10&t=2s

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	3	-	2	-	-	-	3	-	-	1	-	2
CO3	-	2	1	2	2	-	-	-	-	-	-	-	2	-	2
CO4	-	2	1	-	-	-	-	-	-	-	-	-	1	3	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BTech-Electronics_and_Communication

Title of the Course	Wireless Ad hoc Networks
Course Code	ECE0752[T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Basic knowledge of communication			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the concepts of communication.**(BL1-Remember)** **CO2-** To understand the under lying technologies of wireless networks.**(BL2-Understand)** **CO3-** Apply to select the appropriate protocol for various applications**(BL3-Apply)** **CO4-** Analyze energy management in ad-hoc wireless networks.**(BL4-Analyze)** **CO5-** Evaluate the existing network and improve its quality of service and deficiencies in existing wireless protocols for MAC layer and Network layer, and then go onto formulate new and better protocols.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Wireless Ad Hoc Networks Introduction to various Wireless Networks and Standards (802..11 / 802.15.4), Cellular and Wireless Ad Hoc Networks, Architecture of Wireless Ad Hoc Network, Issues and Challenges in Wireless Ad Hoc Networks, Applications of Wireless Ad Hoc Networks	Lecture Method / Video/ Group Discussion / Case study / Simulation	12
2	MAC Protocol for Wireless Ad hoc Networks Introduction to Medium Access Control (MAC) Protocols, Issues in Designing a MAC Protocol for Wireless Ad Hoc Networks, Performance Parameters of Wireless Ad Hoc Networks, Classification of MAC Protocols for Wireless Ad Hoc Networks.	Lecture Method / Video/ Group Discussion / Case study / Simulation	10
3	Routing Protocol for Wireless Ad hoc Networks Introduction, Issues in Designing a Routing Protocol for Wireless Ad Hoc Networks, Classification of Routing Protocols, Destination Sequenced Distance Vector (DSDV) Routing Protocol, Dynamic Source Routing (DSR) Protocol, Ad Hoc Distance Vector (AODV) Routing Protocol, Zone Routing Protocol (ZRP), Multicasting Routing in Wireless Ad Hoc Networks.	Lecture Method / Video/ Group Discussion / Case study / Simulation	10
4	Wireless Sensor Networks Introduction to Wireless Sensor Networks, Comparison with Wireless Ad Hoc Networks, Architecture of Wireless Sensor Network, Issues and Challenges of Wireless Sensor Networks, Design Requirements of Wireless Sensor Networks, Performance Parameters of Wireless Sensor Networks, Applications of Wireless Sensor Networks	Lecture Method / Video/ Group Discussion / Simulation	10
5	Hardware Components and Protocols for Wireless Sensor Networks Introduction to Wireless Sensor Nodes, Architecture of a Basic Sensor Node, Hardware Components of Wireless Sensor Networks, Different Sensor Nodes, MAC Protocols and Routing Protocols for Wireless Sensor Networks, Various Network Simulators for Wireless Sensor Networks.	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**

Part E

Books	(1) C Siva Ram Murty and B S Manoj, Wireless Communication-Principles and Practice, Pearson Education (2) Mohamed Illayas, Handbook of Ad Hoc Wireless Network, CRC Press (3) Kazem Sohraby, Daniel Minoli, Taieb Znati, John Wiley & Sons, Wireless Sensor Networks Technology, Protocols, and Applications, John Wiley & Sons.
Articles	(1) Sharma, Bharati, Mayank Satya Prakash Sharma, and Ranjeet Singh Tomar. "A survey: Issues and challenges of vehicular ad hoc networks (VANETs)." Proceedings of International Conference on Sustainable Computing in Science, Technology and Management (SUSCOM), Amity University Rajasthan, Jaipur-India. 2019. (2) Sharma, Bharati, Mayank Satya Prakash Sharma, and Ranjeet Singh Tomar. "A survey: Issues and challenges of vehicular ad hoc networks (VANETs)." Proceedings of International Conference on Sustainable Computing in Science, Technology and Management (SUSCOM), Amity University Rajasthan, Jaipur-India. 2019.
References Books	(1) Mohamed Illayas and Imad Mahgoub, Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems, CRC Press.
MOOC Courses	https://nptel.ac.in/courses/106105160
Videos	https://www.youtube.com/watch?v=tlqkVh2Amul

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	1	-	2	-	-	-	-	-	3	-	2	-	-	-
CO2	-	2	-	3	-	-	-	-	-	3	-	2	-	-	-
CO3	-	3	-	3	-	2	-	-	-	1	1	2	-	-	-
CO4	-	2	-	1	2	-	-	-	-	-	1	2	-	-	-
CO5	-	1	-	-	2	-	-	-	-	-	-	1	-	-	-
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)** **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)** **CO3-** Apply statistical methods to develop and evaluate the models. **(BL3-Apply)** **CO4-** Analysis the data collected from different applications. **(BL4-Analyze)** **CO5-** Evaluate statistical methods in EDA. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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 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 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	Cloud Computing
Course Code	ECE0764[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-** To provide students with the fundamentals and essentials of Cloud Computing.**(BL1-Remember)** **CO2-** To provide sound foundation to compare the advantages and disadvantages of various cloud computing platforms to start using cloud computing services in their real life.**(BL2-Understand)** **CO3-** To apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost. Identify resource management fundamentals**(BL3-Apply)** **CO4-** Program data intensive parallel applications in the cloud, i. e. Analyze the performance, scalability, and availability of the underlying cloud technologies and software**(BL4-Analyze)** **CO5-** Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google App Engine.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to Cloud Computing: Overview of Computing, Cloud computing (NIST Model), Properties, Characteristics and disadvantages of Cloud Computing, Role of Open Standards	Lecture Method/Video Clips/Group Discussion	10
II	Cloud Computing Architecture: Cloud Computing Stack, Service Models: Infrastructure aa a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Cloud Computing Deployment models: Public, Private, Hybrid	Lecture Method/Video Clips/Group Discussion	10
III	Service Management in Cloud Computing: Service Level Agreement (SLA), Cloud Economics, Resource Management in Cloud Computing	Lecture Method/Video Clips/Group Discussion	10
IV	Data Management in Cloud Computing: Looking at Data, Scalability and Cloud Services, Database and Data Stores in Cloud, Large Scale Data Processing	Lecture Method/Video Clips/Group Discussion	10
V	Cloud Security: Infrastructure Security, Data Security and Storage, Identity and Access Management, Access Control, Trust, Reputation, Risk Research Trends in Cloud Computing, Fog Computing	Lecture Method/Video Clips/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	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms Wiley,2011
Articles	Dang, L.M.; Piran, M.J.; Han, D.; Min, K.; Moon, H. A Survey on Internet of Things and Cloud Computing for Healthcare. Electronics 2019, 8, 768. https://doi.org/10.3390/electronics8070768
References Books	Barrie Sosinsky, Cloud Computing Bible, John Wiley & Sons, 2010
MOOC Courses	https://onlinecourses.nptel.ac.in/noc21_cs14/preview
Videos	https://www.coursera.org/browse/information-technology/cloud-computing

Course Articulation Matrix

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

Syllabus-2023-2024

BTech-Electronics_and_Communication

Title of the Course	Industrial Electronics
Course Code	ECE0829[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 about the latest electronic devices available in industry**(BL1-Remember)** **CO2-** Be able to understand the functions of power electronics circuit**(BL2-Understand)** **CO3-** Apply critical thinking in solving industrial electronic problems **(BL3-Apply)** **CO4-** Analyze the characteristics of MOSFET, IGBT and UJT**(BL4-Analyze)** **CO5-** To evaluate the performance of various types of circuit**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	**Contents**	**Pedagogy**	**Hours**
1	Power Supplies Power supply, rectifiers (half wave, full wave), performance parameters of power supplies, filters (capacitor, inductor, inductor-capacitor, pi filter), bleeder resistor, voltage multipliers . Regulated power supplies (series and shunt voltage regulators, fixed and adjustable voltage regulators, current regulator), switched regulator (SMPS), comparison of linear and switched power supply, switch mode converter (flyback, buck, boost, buk-boost, cuk converters)	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Thyristors Silicon controlled rectifies (SCR), constructional features, principle of operation, SCR terminology, turn-on methods, turn-off methods, triggereing methods of SCR circuits, types of commutation, comparison of thyristors and transistors, thermal characteristics of SCR, causes of damage to SCR, SCR overvoltage protection circuit, seies and parrel operation of sCRs, Line commutated converters (half wave rectifier with inductive and resistive load, single phase and three phase full wave rectifiers)	Lecture Method/ Case Study/ Video/ Group Discussion	12
3	Other members of SCR family Triacs, Diacs, Quadracs, recovery characteristics, fast recovery diodes, power diodes, power transistor, power MOSFET, Insulated gate bipolar transistor (IGBT), loss of power in semiconductor devices, comparison between power MOSFET, power transistor and power IGBT	Lecture Method/ Case Study/ Video/ Group Discussion	12
4	Applications of OP-AMP Basics of OP-AMP, relaxation oscillator, window comparator, Op-comp as rectangular to triangular pulse converter and vice- versa, Wien bridge oscillator, function generator, frequency response of OP-AMP, simplified circuit diagram of OP-AMP, power supplies using OP-AMP, filters (low-pass, high pass) using OP-AMP.	Lecture Method/ Case Study/ Video/ Group Discussion	10
5	Functions, applications, advantages and disadvantages of PLC over conventional relay controllers, comparison of PLC with process control computer system, factors to be considered in selecting PLC, functional block diagram of PLC, microprocessor in PLC, memory, input and output modules (interface cards), sequence of operations in a PLC, status of PLC, event driven device, ladder logic language, simple process control applications of PLC, Programming examples	Lecture Method/ Case Study/ Video/ Group Discussion	10

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

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) Rehg, James, A., Sartori, Glenn. Industrial Electronics. 5th ed. Upper Saddle River: Prentice Hall. 2006
Articles	https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=63
References Books	1) Maloney, Timothy. Modern Industrial Electronics, 5th ed.Upper Saddle River: Prentice Hall. 2004
MOOC Courses	https://www.coursera.org/specializations/power-electronics
Videos	https://archive.nptel.ac.in/courses/108/102/108102145/

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	-	-
CO2	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO4	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CO5	2	3	2	-	-	-	-	-	-	-	-	3	3	3	-
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)** **CO2-** Understand the Basic concept of Image processing **(BL3-Apply)** **CO3-** Apply the concept of Digital Image Processing **(BL3-Apply)** **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)** **CO5-** Implement and evaluate the image enhancement, edge detection and noise analysis **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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 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 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	Soft Computing
Course Code	ECE0840 [T]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Basic concepts and applications of soft computing tools such as neural networks, fuzzy logic systems, and several optimization techniques like genetic algorithms, evolutionary computation, simulated annealing etc.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Describe the role of artificial intelligence techniques in real world**(BL1-Remember)** **CO2-** Apply fuzzy logic controller for electrical engineering problem**(BL2-Understand)** **CO3-** Apply different neural network controller for electrical engineering problem**(BL3-Apply)** **CO4-** Apply and compare performance of different optimization techniques for electrical engineering problem**(BL4-Analyze)** **CO5-** Identify and select a suitable Soft Computing technology to solve the problem; construct a Solution and implement a Soft Computing solution**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger)				

Part B

Modules	Contents	Pedagogy	Hours
1	INTRODUCTION TO SOFT COMPUTING: Concept of computing systems. "Soft" computing versus "Hard" computing, characteristics of Soft computing, Some applications of Soft computing techniques.	Lecture Method / Video/ Group Discussion / Case study	12
2	FUZZY LOGIC: Fuzzy sets, logic operations, and relations; Fuzzy decision-making; fuzzy inference systems; design steps in fuzzy logic controller; application of fuzzy logic controller in Electrical engineering.	Lecture Method / Video/ Group Discussion / Case study	10
3	NEURAL NETWORKS: Basic concepts and major classes of neural networks, supervised and unsupervised learning, Single-layer perceptron, Multi-layer perceptron, Back Propagation Neural network, Recurrent neural networks, support vector machine, Application of neural network modelling / control problems in Electrical engineering	Lecture Method / Video/ Group Discussion / Case study	10
4	OPTIMIZATION TECHNIQUES: Genetic algorithms, Evolutionary Algorithm, Simulated Annealing, Ant colony optimization -Applications to Electrical engineering problems.	Lecture Method / Video/ Group Discussion / Case study	10
5	Genetic Algorithms: Advantages and Limitations of Genetic Algorithm; Applications of Genetic Algorithm; Applications of GA in Machine Learning. Introduction to Hybrid Systems; MATLAB Environment for Soft Computing Techniques.	Lecture Method / Video/ Group Discussion / Case study	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. George J.Klir and Bo Yuan, Fuzzy sets and Fuzzy Logic, Second Edition, PHI, 2006 2. J.M.Zurada, Introduction to artificial neural systems, Jaico Publishing House, 2006 3. D.E. Goldberg, Genetic algorithms in search, optimization, and machine learning, Addison-Wesley.
Articles	1. Rao, K. Koteswara, and G. Svp Raju. "An overview on soft computing techniques." International Conference on High Performance Architecture and Grid Computing. Berlin, Heidelberg: Springer Berlin Heidelberg, 2011. 2. Das, Santosh Kumar, et al. "On soft computing techniques in various areas." Comput. Sci. Inf. Technol 3.59 (2013): 166.
References Books	1. S.N.Sivanandam, and S.N.Deepa, Principles of Soft computing, Second Edition, Wiley India Pvt. Ltd, 2013. 2. N.P.Padhy and S.P.Simon, Soft computing with MATLAB programming, Oxford publishers, 2015.
MOOC Courses	https://onlinecourses.nptel.ac.in/noc20_cs17/preview
Videos	https://www.youtube.com/watch?v=6xTmkJM0Yi8&t=2s

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	3	-	2	-	-	-	3	-	-	3	2	2
CO3	-	2	1	2	2	-	-	-	-	-	-	-	3	2	3
CO4	-	2	-	3	-	-	-	-	-	-	-	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BTech-Electronics_and_Communication

Title of the Course	Wireless Networks
Course Code	ECE0843[T]

Part A

Year	4th	**Semester**	8th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Specific Elective							
Pre-Requisite/s	Basic Knowledge of Cellular communication and communication protocols			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the concepts of cellular and mobile communication**(BL1-Remember)** **CO2-** To understand & gain the knowledge on 1G, 2G, 3G, 4G and 5G technology. **(BL2-Understand)** **CO3-** To apply to select the suitable network depending on the availability and requirement**(BL3-Apply)** **CO4-** To analyzing the suitable network depending on the availability and requirement. **(BL4-Analyze)** **CO5-** To evaluation of various mobile communication parameter (Gain, Bandwidth etc).**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction and Development of Wireless Network: Growth of mobile communication, First generation system, Second Generation system, Path to third generation technology, 4G and Beyond, Next generation wireless network, Mobile communication fundamental, basic network architecture, Air interface access techniques , Roaming and Handoff/ Handover, Mobile data in wireless network.	Lecture Method / Video/ Group Discussion / Simulation	12
2	Equalizers- Fundamentals of Equalization, Equalizers in Communication Receiver, Linear Equalizer, Algorithms for Adaptive Equalization, Diversity Techniques. Characteristics of Speech Signals, Quantization Techniques, Vocoders, Linear Predictive Coders, Multiple Access Techniques for Wireless Communications. Third generation Technology: Introduction, Universal Mobile Telecommunication System (UMTS), Wideband code division multiple access(WCDMA) basics, WCDMA air interface, UMTS Terrestrial radio access network (UTRAN) architecture, High speed packet data, High speed packet access (HSPA) architecture , Code division multiple access 2000 (CDMA2000), Time division –code division multiple access (TD-CDMA), Time division –synchronous code division multiple access (TD-SCDMA)T5, Implementation , Handover and comparisons.	Lecture Method / Video/ Group Discussion / Simulation	10
3	Long Term Evolution: Introduction, LTE ecosystem, Standards, radio spectrum, LTE Architecture, User equipment (UE), Enhanced Node B (eNodeB), Core network, radio channel components, TD-LTE, LTE scheduler, Handover (X2, S1 and inter- MME), Self organizing network (SONs), Relay cell, heterogeneous network (Het NET), Vo LET, LTE advanced.	Lecture Method / Video/ Group Discussion	10
4	Worldwide Interoperability for Microwave (WIMAX): Introduction, Standards, generic WiMAX architecture, Core network, radio network, WiMAX spectrum, WiMAX modulation, Channel structure, Mixed mode, frequency planning and Quality of service (QOS), handover, WiMAX Features and applications.	Lecture Method / Video/ Group Discussion	10
5	Wi-Fi: Introduction, Standards, Protocols, Frequency Allocation, Modulation and Coding Schemes, Network architecture, Typical Wi-Fi configuration, Hotspots, VPNs, Wi-Fi Integration with 3G/ 4G security, Benefits of convergence of Wi-Fi and wireless Mobile	Lecture Method / 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) Clint Smith and Daniel Collins, Wireless Network, McGraw Hill education (2) Jochen Schiller, Mobile Communications, Second Edition, Pearson Education (3) Vijay Garg, Wireless Communications and networking, First Edition, Elsevier
Articles	(1) Liang, Chengchao, and F. Richard Yu. "Wireless network virtualization: A survey, some research issues and challenges." IEEE Communications Surveys & Tutorials 17.1 (2014): 358-380. (2) Zhang, Chaoyun, Paul Patras, and Hamed Haddadi. "Deep learning in mobile and wireless networking: A survey." IEEE Communications surveys & tutorials 21.3 (2019): 2224-2287.
References Books	(1) Clint Smith and Daniel Collins, 3G Wireless with 802.16 and 802.11, McGraw Hill Education
MOOC Courses	https://archive.nptel.ac.in/courses/117/102/117102062/
Videos	https://www.youtube.com/watch?v=CUyF0YGIA5Y

Course Articulation Matrix

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

Syllabus-2023-2024

BTech-Electronics_and_Communication

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)** **CO2-** To understand the operation of various electronic devices **(BL2-Understand)** **CO3-** To implement the concepts of semiconductors to various semiconductor devices **(BL3-Apply)** **CO4-** To analyze the various electronic devices and their frequency response.**(BL4-Analyze)** **CO5-** To evaluate the performance of electronic devices such as diodes, transistors, function generators, and cathode ray oscilloscopes.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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

M

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	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	Boylestad & Nashelsky Electronics Devices and Circuit Theory Pearson Education India, 2009. 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. Sedra and Smith, Microelectronics circuits, Fifth edition by Oxford University Press 2017 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-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)** **CO2-** To understand the operation of various electronic devices like BJT, JFET, and MOSFET. **(BL2-Understand)** **CO3-** To apply the concept of amplifiers to the various types of feedback amplifiers. **(BL3-Apply)** **CO4-** To analyze various electronics devices and their frequency response.**(BL4-Analyze)** **CO5-** To design various types of oscillators and feedback amplifiers. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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 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	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)** **CO2-** To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations **(BL2-Understand)** **CO3-** To Apply simple logical operations using combinational logic circuits [BL3]**(BL3-Apply)** **CO4-** To analysis of combinational logic circuits, sequential logic circuits [BL4] **(BL4-Analyze)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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 Fundamental of digital circuits by A.ANANDKUMAR,PHI Publication Digital Fundamaentals by FLOYD & JAIN, Pearsons Pub 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 2) W.H. Gothman, Digital Electronics, PHI 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

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					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)** **CO2-** To understand & gain the knowledge on basic network elements**(BL2-Understand)** **CO3-** To implement the concept of TPN, RLC, RL, LC, RC circuits in other electronics devices. **(BL3-Apply)** **CO4-** To analyze the various electrical and electronics hardware circuit and Gain the knowledge about network Synthesis.**(BL4-Analyze)** **CO5-** To Evaluation of various electrical parameters (current, voltage, power etc.) of RLC circuits.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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

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 (2) Chakrabarti, A, Circuit Theory Analysis and Synthesis, Dhanpat Rai & Co., Seventh - Revised edition (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}, (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 (2) Kuo, F, Network Analysis and Synthesis, John Wiley (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 (2) https://www.youtube.com/watch?v=O2GoxZqhlzA (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)** **CO2-** Understanding various operating modes of Op-amp and its linear/non-linear applications**(BL2-Understand)** **CO3-** apply the concepts of transistors to understand the working of power amplifiers**(BL3-Apply)** **CO4-** To analyze various operational amplifier circuits.**(BL4-Analyze)** **CO5-** To evaluate the performance of various types of active filters and their design**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) 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 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)** **CO2-** Understand the digital systems as an activity in a larger systems design context**(BL2-Understand)** **CO3-** Apply the concept of digital system design**(BL3-Apply)** **CO4-** Analyze the concept of digital system design**(BL4-Analyze)** **CO5-** Evaluate Programmable logic devices (PLDs) and networks of arithmetic operations.B**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) 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)** **CO2-** To Understand basic characteristics of signal, Modulation & demodulation techniques of AM, DSB, SSB &VSB**(BL2-Understand)** **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)** **CO4-** To evaluation of various communication parameters (Power, Energy, Modulation index etc.)**(BL4-Analyze)** **CO5-** To Design low power AM and FM transmitters and receivers. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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 (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. (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 (2) Simon Haykins Communication systems 4thEdition (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)** **CO2-** To understand the important functions, concepts, algorithms &types of WSNs, Protocols. **(BL2-Understand)** **CO3-** To apply the knowledge of programming to achieve a specific task/challenge. Gain knowledge about Power Management of WSNs**(BL3-Apply)** **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)** **CO5-** To evaluate the applications of WSN in various fields such as research and industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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 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 Integration of WSN with IoT Applications: A Vision, Architecture, and Future Challenges Springer Nature Switzerland AG 2020 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 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	Electromagnetic Theory
Course Code	ECL0512[T]

Part A

Year	3rd	**Semester**	5th	**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 get familiarized with various coordinate systems**(BL2-Understand)** **CO2-** To understand the various laws and theorems related to electromagnetics**(BL1-Remember)** **CO3-** To apply various laws and theorems to derive Maxwell's equations**(BL3-Apply)** **CO4-** To analyse various types of transmission mediums**(BL4-Analyze)** **CO5-** To evaluate the performance of transmission lines**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours
1	Prerequisite: Knowledge of vector algebra. Coordinate Systems and Transformation: Cartesian Coordinates, Circular 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 a vector and Stoke's theorem, Laplacian of a scalar.	white board, ppt	14
2	Electrostatics: 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.	white board, ppt	12
3	3 Magnetostatics: 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 with whiteboard/PPT, Recorded video/interactive videos,	white board, ppt	10
4	Waves and applications: 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.	white board, ppt	12
5	Introduction of Wave Propagation in Bounded Medium, Transmission Lines: Transmission line parameters, Transmission line equations, Lossless lines, Distortion less line, Input impedance, Standing Wave Ratio and Power, The Smith chart, Some applications of transmission lines.	white board, ppt	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	Elements of Electromagnetic, Mathew N.O Sadiku, Oxford Engineering Electromagnetic, William H. Hayt, TMH
Articles	
References Books	Electromagnetics, John D. Kraus,Tata McGraw Hill Electromagnetic wave and Radiating System, Jordan Balman, PHI Element of Engineering Electromagnetic, N.N. Rao, 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	1	1	1	-	1	1	-	-	-	1	1	2	1	2
CO2	1	1	1	1	1	1	-	-	-	-	1	1	3	2	2
CO3	1	1	1	1	1	-	1	-	-	-	1	-	2	2	3
CO4	1	1	-	1	-	1	1	-	-	-	1	1	2	2	2
CO5	1	-	1	1	1	1	-	-	-	-	1	1	2	3	2
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)** **CO2-** Understanding practical implementation issues, such as non-ideal filters, non-ideal sampling pulses, aliasing, and intersymbol-interference (ISI)[BL2] **(BL2-Understand)** **CO3-** Apply error control coding techniques for efficient communication [BL3]**(BL3-Apply)** **CO4-** To analyze digital pulse modulation techniques [BL4]**(BL4-Analyze)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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 2)Singh and Sapre, Communication Systems. 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	Control System
Course Code	ECL0514[T]

Part A

Year	3rd	**Semester**	5th	**Credits**	L	T	P	C
					2	1	1	4
Course Type	Theory only							
Course Category	Disciplinary Major							
Pre-Requisite/s	A basic idea regarding the initial concepts of communication and basic knowledge of the laplace transform.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To become familiar with the concepts of signal & system. **(BL1-Remember)** **CO2-** To understand the requirements of the control system and classification of the control system.**(BL2-Understand)** **CO3-** To applied in real life application to find gain desirable output.**(BL3-Apply)** **CO4-** To analyze transient or steady state behavior of control systems.**(BL4-Analyze)** **CO5-** To evaluate the stability and characteristic of various types of control system. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Basic Components of a control system, Feedback and its effect, types of feedback control systems. Block diagrams and signal flow graphs, Modeling of Physical systems: electrical networks, mechanical systems elements, equations of mechanical systems, sensors and encoders in control systems, DC motors in control systems	Lecture Method / Video/ Group Discussion / Case study / Simulation	10
2	Time response analysis: Standard test signals, time response of 1st order system, time response of 2nd order system, steady-state errors and error constants, effects of additions of poles and zeros to open loop and closed loop system. Time domain stability analysis Concept of stability of linear systems, effects of location of poles on stability, necessary conditions for stability, Routh-Hurwitz stability criteria, relative stability analysis, Root Locus concept, guidelines for sketching Root-Locus.	Lecture Method / Video/ Group Discussion / Simulation	12
3	Frequency response analysis: Correlation between time and frequency response, Polar plots, Bode Plots, all-pass and minimum-phase systems, log-magnitude versus Phase-Plots. Frequency domain stability analysis Nyquist stability criterion, assessment of relative stability using Nyquist Criterion (phase margin, gain margin and stability), closed-loop frequency response	Lecture Method / Video/ Group Discussion / Simulation	10
4	State-Variable Analysis: Vector matrix representation of state equation, state transition matrix, state-transition equation, relationship between state equations and high-order differential equations, relationship between state equations and transfer functions, controllability and observe ability.	Lecture Method / Video/ Group Discussion / Simulation	10
5	Approaches to system design: Design problem, types of compensation, design of phase-lag, phase lead and phase lead-lag compensators in time and frequency domain, proportional, derivative, integral and PID compensation. Digital control systems System with digital controller, difference equations, the z-transform, pulse transfer function, inverse z transform, s and z domain relationship.	Lecture Method / Video/ Group Discussion / 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**
0	0	0	0	0	0

Part E

Books	(1) B S Manke, Linear Control Systems, Linear Control Systems (2) B.C. Kuo and Farid Golnaraghi Automatic Control Systems John Wiley India. (3) Nagrath & Gopal Control System Engineering New age International
Articles	(1) Misir, Dave, Heidar A. Malki, and Guanrong Chen. "Design and analysis of a fuzzy proportional-integral-derivative controller." Fuzzy sets and systems 79.3 (1996): 297-314. (2) Isaksson, A. J., and S. F. Graebe. "Derivative filter is an integral part of PID design." IEE Proceedings-Control Theory and Applications 149.1 (2002): 41-45.
References Books	(1) K. Ogata, Modern Control Engineering, Prentice Hall of India. (2) Joseph J. Distefano III, Allen R. Stubberud, Ivan J. Williams, Control Systems TMH
MOOC Courses	https://onlinecourses.nptel.ac.in/noc20_ee90/preview
Videos	https://www.youtube.com/watch?v=Cl23xQrvFhk&t=1s

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	3	-	-	3	-	2
CO3	2	2	1	2	2	-	-	-	-	-	-	-	3	-	2
CO4	1	2	1	3	-	-	-	-	-	-	-	-	3	2	3
CO5	1	2	-	2	-	-	-	-	-	-	-	-	1	3	3
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)** **CO2-** Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller**(BL3-Apply)** **CO3-** Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.**(BL4-Analyze)** **CO4-** Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.**(BL5-Evaluate)** **CO5-** Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements**(BL5-Evaluate)** **CO6-** To train their practical knowledge through laboratory experiments.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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/ 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)** **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)** **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)** **CO4-** To analyze the signals & systems by using computer programming tools to process and visualize signals & Systems **(BL4-Analyze)** **CO5-** To evaluate signal processing strategies at multidisciplinary activities.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**		SDG1(No poverty) 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 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 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

					L	T	P	C
Year	3rd	**Semester**	6th	**Credits**	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.**()** **CO2-** To understand various types of antenna and modes of propagation**(BL2-Understand)** **CO3-** To apply the concept of the principle of pattern multiplication to antenna arrays.**(BL3-Apply)** **CO4-** To analyze various type antennas and various modes of propagation. es of dipol**(BL4-Analyze)** **CO5-** To evaluate the performance of various types of antennas and antenna arrays and their design.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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 (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 (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. (2) A. R. Harish and M. Sachidananda Antennas and Wave Propagation Press.Oxford University Press (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)** **CO2-** To understand the important functions, concepts & architecture of microcontrollers. **(BL2-Understand)** **CO3-** To apply the knowledge of microcontroller programming and system to perform a specific task**(BL3-Apply)** **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)** **CO5-** To evaluate the applications of microcontrollers in various fields such as research and industries **(BL5-Evaluate)** **CO6-** To create/provide solutions for real world embedded systems. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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 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	Cellur & Mobile communication
Course Code	ECL0621[T]

Part A

Year	3rd	**Semester**	6th	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Discipline Core							
Pre-Requisite/s	Basic Concept of Communication			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the concepts of analog & digital communication.**(BL1-Remember)** **CO2-** To understand & gain knowledge on the concept of cellular communication and devices.**(BL2-Understand)** **CO3-** To apply frequency-reuse concept in mobile communications, and to analyze its effects on interference, system capacity, handoff techniques.**(BL3-Apply)** **CO4-** To analyze path loss and interference for wireless telephony and their influences on a mobile communication system's performance.**(BL4-Analyze)** **CO5-** To evaluation of various cellular parameters (gain, fading, propagation losses, etc).**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education)				

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction: Evolution of Mobile Radio Communication Fundamentals. Large Scale Path Loss: Propagation Models, Reflection, Diffraction, Scattering, Practical Link Budget Design using Path Loss Model. Small Scale Fading & Multipath Propagation and Measurements, Impulse Response Model and Parameters of Multipath Channels. Small Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small Scale Fading.	Lecture Method / Video/ Group Discussion / Case study	12
2	Equalizers- Fundamentals of Equalization, Equalizers in Communication Receiver, Linear Equalizer, Algorithms for Adaptive Equalization, Diversity Techniques. Characteristics of Speech Signals, Quantization Techniques, Vocoders, Linear Predictive Coders, Multiple Access Techniques for Wireless Communications.	Lecture Method / Video/ Group Discussion	10
3	Cellular Fundamentals: Cellular Concepts, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular System.	Lecture Method / Video/ Group Discussion / Case study	10
4	Global System for Mobile (GSM): GSM System for Mobile: Services and Features, System Architecture, Radio Sub system Channel Types, Frame Structure. CDMA Digital Cellular Standard (IS 95), Frequency and Channel Specifications, Forward CDMA Channel and Reverse CDMA Channel.	Lecture Method / Video/ Group Discussion	10
5	Introduction to Mobile Ad-hoc Networks, Mobile Data Networks, Wireless Standards IMT2000, Introduction to 4G,5G and Concept of NGN	Lecture Method / Video/ Group Discussion / Case study	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) T. S. Rappaport, Wireless Communication-Principles and Practice, Pearson Education (2) R. Pandya Mobile and Personal Communication System Prentice Hall of India (3) V.K.Garg, J. E.Wilkes, Principle and Application of GSM Pearson Education, 8th edition
Articles	(1) Novlan, Thomas David, et al. "Analytical evaluation of fractional frequency reuse for OFDMA cellular networks." IEEE Transactions on wireless communications 10.12 (2011): 4294-4305. (2) Gu, Guifen, and Guili Peng. "The survey of GSM wireless communication system." 2010 international conference on computer and information application. IEEE, 2010.
References Books	(1) Lee, Cellular and Mobile Communication, McGraw Hill (2) Faher Kamilo Wireless Digital Communication Prentice Hall of India
MOOC Courses	https://nptel.ac.in/courses/106106167
Videos	https://www.youtube.com/watch?v=HcphXq4TMxk

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	-	-	3	-	2
CO3	-	2	1	2	2	-	-	-	-	-	-	-	3	-	2
CO4	-	2	1	3	-	-	-	-	-	-	-	-	3	2	3
CO5	-	-	-	2	-	-	-	-	-	-	-	-	1	3	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)** **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)** **CO3-** To implement various Machine Learning Models.**(BL3-Apply)** **CO4-** To train & test machine Learning Models. **(BL4-Analyze)** **CO5-** To evaluate the performance of Machine Learning Models.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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)** **CO2-** To understand basic concepts and applications of microwave systems.**(BL2-Understand)** **CO3-** To solve problems related to microwave transmission lines, microwave waveguide.**(BL3-Apply)** **CO4-** To analyze, test and use various passive microwave components for different applications.**(BL4-Analyze)** **CO5-** To evaluation of various characteristic and microwave parameters like VSWR, impedance, power, wavelength etc. of microwave devices.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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. (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 (2) Das Microwave EngineeringTMH (3) Collins Foundations of Microwave Engineering Wiley India (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	VLSI Technology
Course Code	ECL0733[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-** To understand the aspects of semiconductor device fabrication, such as: oxidation, photolithography, wet etching, metal deposition, ion implantation and annealing.**(BL2-Understand)** **CO2-** To apply VLSI design circuits by keeping technological process constraints in mind**(BL3-Apply)** **CO3-** To specify NMOS and CMOS design rules corresponding to 180nm, 90nm, 45 nm technologies **(BL4-Analyze)** **CO4-** To evaluate the Plan a sequence of processing steps to fabricate a solid state device to meet geometric, electrical, and/or processing parameters.**(BL5-Evaluate)** **CO5-** To create and design various hardware oriented circuits and Layout of CMOS Integrated**(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth)				

Part B

Modules	Contents	Pedagogy	Hours
1	Overview of Semiconductor Processing: Electronic grade silicon preparation, Crystal growth, Czochralski process, wafer-preparation, slicing, Marking, polishing, evaluation. Basic wafer fabrication operations, wafer sort, clean room construction and maintenance.	lecture method/Group Discussion	9
2	Oxidation: Objectives, Silicon dioxide layer uses, Thermal oxidation mechanism and methods, Kinetics of oxidation, Deal Grove model, Oxidation processes, post oxidation evaluation.	lecture method/Project based learning	10
3	Basic Patterning: Overview of Photo-masking process, Ten step process, Basic photoresist chemistry, comparison of positive and negative photoresists, X-ray lithography, Electron beam exposure system.	lecture method/Project based learning	10
4	Doping: Definition of a junction, Formation of doped region and junction by diffusion, diffusion process steps, deposition, drive-in-oxidation, Ion implantation- concept and system, implant damage, Comparison of diffusion and ion-implantation techniques.	lecture method/Project based learning	10
5	Deposition: Chemical Vapor Deposition (CVD), CVD Process steps, CVD System types, Low- Pressure CVD (LPCVD), Plasma-enhanced CVD (PECVD), Vapor Phase Epitaxy (VPE), Molecular Beam Epitaxy (MBE), Metalorganic CVD (MOCVD), SOS (Silicon on Sapphire) and SOI (silicon on Insulator). Brief Introduction to Metallization.	lecture method/Project based learning	11

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	Sze, S.M., (2011). VLSI Technology, Second Edition, Tata McGraw Hill Publishing Co. Ltd.
Articles	https://ieeexplore.ieee.org/document/10528351
References Books	Gandhi, S. K., (1994). VLSI Fabrications Principles, Wiley Publishing Co. Ltd. Runyan, W. R., (2008). Silicon Semiconductor Technology, Tata McGraw Hill Publishing Co. Ltd. Zant, P. V., (2018). Microchip Fabrication, Tata McGraw Hill Publishing Co. Ltd.
MOOC Courses	https://nielit.gov.in/calicut/calicut/content/vlsi-beginners https://www.mooc-list.com/tags/vlsi#google_vignette
Videos	https://ieeexplore.ieee.org/document/10510835

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	-	-	3	-	2
CO3	-	2	1	2	2	-	-	-	-	-	-	-	3	-	2
CO4	-	2	1	3	-	-	-	-	-	-	-	-	3	2	3
CO5	-	-	-	2	-	-	-	-	-	-	-	-	1	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)** **CO2-** To understand the different kind of losses and signal distortions in fibers.**(BL2-Understand)** **CO3-** To apply various laws and theory of ray optics to understand the working of optical fiber communication system**(BL3-Apply)** **CO4-** To analyze signal degradation in optical fiber.**(BL4-Analyze)** **CO5-** To evaluate the performance fiber optic transmission system. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕	**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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}, (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. (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)** **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)** **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)** **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)** **CO5-** To design various hardware oriented circuits and Layout of CMOS Integrated Circuits.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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. 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 Wolf, W. (2002). Modern VLSI Design: System on Chip. Pearson
MOOC Courses	https://www.udemy.com/course/cmos-digital-vlsi-for-beginners/?couponCode=NVDPRODIN35 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	Electric Vehicle Technology
Course Code	ECO0701A[T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	0	0	3
Course Type	Theory only							
Course Category	Open Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** •CO1: Identify various types of EV's and their characteristics **(BL1-Remember)** **CO2-** CO2: Describe battery basics and their types in EV and HEV**(BL2-Understand)** **CO3-** CO3: Identify various types of electrical machines used in EV installation**(BL3-Apply)** **CO4-** CO4: Describe Solar panel design and integration. **(BL4-Analyze)** **CO5-** CO5: Identify installation and commissioning of solar panel. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG3(Good health and well-being) SDG4(Quality education) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action)				

Part B

Modules	Contents	Pedagogy	Hours
I	UNIT-I The knowledge of Principles of EV and HEV and Basic knowledge about renewable energy sources UNIT-I No. of Lectures: 8 Types of EV : 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	Lecture Method/Video	8
II	UNIT-II No. of Lectures: 07 EV Batteries : Electric Vehicle Operation, Battery Basics, Introduction to Electric Vehicle Batteries, Fuel Cell Technology, Choice of a Battery, Electric Vehicle 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	Lecture Method/Video Clips/Group Discussion	8
III	UNIT-III No. of Lectures: 08 Special Electrical Machines for EV : 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	Lecture Method/Video Clips/Group Discussion	9
IV	UNIT-IV No. of Lectures: 08 Solar Panel Design and Integration : 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	Lecture Method/Video Clips/Group Discussion	10
V	UNIT-V No. of Lectures: 07 Solar Panel Installation and Commissioning : 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	Lecture Method/Video Clips/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	Babu, A. (n.d.). Electric & Hybrid Vehicles. KHANNA PUBLISHING HOUSE. http://books.google.ie/books?id=AzsIEAAAQBAJ&printsec=frontcover&dq=9789386173713&hl=&cd=1&source=gbs_api Tripathi, P. (2022, June 15). Handbook on Electric Vehicles Manufacturing (E- Car, Electric Bicycle, E- Scooter, E-Motorcycle, Electric Rickshaw, E- Bus, Electric Truck with Assembly Process, Machinery Equipments & Layout). NIIR PROJECT CONSULTANCY SERVICES. http://books.google.ie/books?id=gSZ1EAAAQBAJ&pg=PA351&dq=8195676928&hl=&cd=1&source=gbs_api
Articles	
References Books	1 Mike Blundell and Damian Harty The Multi body systems Approach to Vehicle Dynamics Elsevier, 2004. 2 John Twidell & Toney Weir Renewable Energy Resources E & F N Spon
MOOC Courses	Electric Vehicles - Part 1 By Prof. Amit Jain | IIT Delhi EV - Vehicle Dynamics and Electric Motor Drives By Prof. Amit Jain, Prof. Avanish Tripathi | IIT Delhi
Videos	https://www.youtube.com/watch?v=UgtjRob5qMg&list=PLyqSpQzTE6M9spod-UH7Q69wQ3uRm5thr https://www.youtube.com/watch?v=L2HbpEMfryM&list=PLp6ek2hDcoNCROoQbG05xNfiBEY7492Vn

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	1	-	-	-	-	1	1	3	2	2
CO3	1	1	1	1	1	-	1	-	-	-	1	-	2	2	3
CO4	1	1	-	1	-	1	1	-	-	-	1	1	2	2	2
CO5	1	1	-	-	-	-	-	-	-	-	1	1	3	2	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)** **CO2-** To explain web application development procedures**(BL2-Understand)** **CO3-** To impart servlet technology for writing business logic**(BL3-Apply)** **CO4-** . To facilitate students to connect to databases using JDBC**(BL4-Analyze)** **CO5-** To evalute various concepts of application development using JSP**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 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 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	Intellectual Property Rights
Course Code	ECO0701C[T]

Part A

Year	4th	**Semester**	7th	**Credits**	L	T	P	C
					3	0	0	3
Course Type	Theory only							
Course Category	Open Elective							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To introduce fundamental aspects of intellectual property rights to students who are going to play a major role in development and management of innovative projects in industries**(BL1-Remember)** **CO2-** To disseminate knowledge on patents, patent regime in India and abroad and registration aspects **(BL2-Understand)** **CO3-** To apply the concept of IPR**(BL3-Apply)** **CO4-** To analyze IPR. To disseminate knowledge on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects **(BL4-Analyze)** **CO5-** Evaluating theory of probability and statistics related to IPR**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction and the need for intellectual property right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967,the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	Elements of Patentability: Novelty, Non Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board	Lecture Method/ Case Study/ Video/ Group Discussion	12
3	Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and license of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights	Lecture Method/ Case Study/ Video/ Group Discussion	12
4	Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non-Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board	Lecture Method/ Case Study/ Video/ Group Discussion	10
5	meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection Geographical Indication (GI) Geographical indication: meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection	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**
0	0	0	0	0	0

Part E

Books	1) Nithyananda, K V. (2019). Intellectual Property Rights. India, IN: Cengage Learning India Private Limited.
Articles	http://op.niscair.res.in/index.php/JIPR
References Books	1) Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.
MOOC Courses	https://www.udemy.com/course/certificate-course-ipr/?--=&gad_source=1&gclid=Cj0KCQjw6PGxBhCVARIsAlumnWYAVsP2ByJ2PaFsYr6Xs5JKQfqgImfwumwXAL_wj2tvGaXZiybXm1YaAsoWEALw_wcB&couponCode=LETSLEARNNOWPP
Videos	https://archive.nptel.ac.in/courses/110/105/110105139/

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	1	2	-	3	-	3	-	-	-	-	1
CO2	-	2	2	-	1	2	-	3	-	3	-	-	-	-	1
CO3	2	2	1	2	-	-	-	-	-	-	-	-	1	-	3
CO4	2	3	1	2	-	-	-	-	-	-	-	-	2	2	3
CO5	2	2	-	1	-	-	-	-	-	-	-	-	2	-	3
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)** **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)** **CO3-** Analyze and interpret data collected during the internship experience. (e.g., analyze customer feedback to improve product design)**(BL3-Apply)** **CO4-** Enhance critical thinking skills by analyzing and evaluating the outcomes of assigned projects or tasks.**(BL4-Analyze)** **CO5-** Compile a comprehensive report documenting the learning experiences, challenges, and achievements during the internship period.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** Classify and formulate the elementary intricacies of Scientific and Technical Writing using application grammar construct.**(BL2-Understand)** **CO3-** Create cohesive technical paragraphs & text.**(BL3-Apply)** **CO4-** Paraphrase text(s) and use appropriate referencing styles**(BL4-Analyze)** **CO5-** Evaluate the significance of Formal Writing**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	Environmental Pollution & Global Issues
Course Code	MCL0201[T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s	Basic knowledge of natural resources, biodiversity, ecological succession, energy flow, environmental issues and problems.			**Co-Requisite/s**	A detailed understanding of the complexity of environment and its challenges and solutions to these problems and challenges.			
Course Outcomes & Bloom's Level	**CO1-** CO1. Develop environmental scientists and engineers and sensitize them towards environmental issues.**(BL2-Understand)** **CO2-** CO2. To acquire analytical skills in assessing environmental impacts through a multidisciplinary approach**(BL3-Apply)** **CO3-** CO3. Ability to distinguish between various methods of various pollution analysis**(BL4-Analyze)** **CO4-** CO4.Acquire expertise and skills needed for the Environmental Management Systems and techniques of monitoring, Environment audit, Environmental Impact Analysis, environment instrumentation and control systems and for the projects development, implementation, and maintenance.**(BL5-Evaluate)** **CO5-** CO5. Students acquire skills for to communicate, prepare, plan and implement the environmental management project**(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✓ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG14(Life below water) SDG15(Life on land) SDG17(Partnerships for the goals)				

Part B

Modules	**Contents**	**Pedagogy**	**Hours**
Unit – 1 (Environment, Ecosystem and Environmental Education)	Environment – Definition and its segments, (Lithosphere, Hydrosphere, Atmosphere and Biosphere), Multidisciplinary nature of Environmental Science, Ecology and Ecosystem: Basic concepts, functions of ecosystem, Energy Flow, Food chain, food web, Ecological Pyramids, Ecological Successions. Environmental Education- Definition, scope, importance, Need for Public Awareness, Environmental Ethics. Environmental Impact Assessment: Screening, Scoping, Base line Analysis, Impact Mitigation, Documentation, Review, Public hearing, Post Project Monitoring.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, discussion (questions & answers section)	8
Unit – 2 (Natural Resources Management)	Natural Resources – Classification, Water Resources (availability, quality, water budget), Mineral Resources (distribution, availability and future perspectives), and Forest Resources. Energy Resources- Classification and alternatives of conventional energy resources-Solar, working of solar photovoltaic cells, Geothermal, Wind energy, Nuclear Energy, Biomass and Bio-gas	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
Unit – 3 (Water, Soil & Noise Pollution)	Water pollution – sources & effects, characteristics and treatment of waste water, engineered systems for water purification: Aeration, solid separation, settling operations, filtration and disinfection. Soil - formation of soil, elementary and mineral composition, types of soil in India, soil pollution, effects and abatements. Noise Hazards: Continuous and impulse noise, Effect of noise on man, Measurement and evaluation of Noise, noise isolation and absorption techniques, silencers, practical aspects of noise.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
Unit –4 (Atmospheric chemistry and Air Pollution)	Classification, sources and toxic effects of air pollutants, dispersal of air pollutants, engineered systems for air purification: Atmospheric cleansing process, approaches to contamination control. Air pollutants with emphasis on reactive intermediates in atmosphere like hydroxyl radical, ozone and nitrate radical, types of hydrocarbon in the troposphere, reaction of organic compounds in the atmosphere. (Green house gas effect, Global warming, Climate change).	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures,Audio/Video clips, Group discussion.	8
Unit – 5 (Waste Management)	Solid waste: Generation and waste characterization. Collection, storage and transport. Waste disposal, waste processing techniques, reduction, reuse and recycling, resource recovery and utilization. Physical and chemical treatment methods and composting. Hazardous waste management and treatment.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion. Field visits. Industrial Visit (MSW/BMW/STP/ETP)	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	Environmental Science by B. S. Chauhan; Firewall Media, 2008 • Environmental Science by Cuningham and Cuningham; McGraw-Hill Education; 13th edition (16 February 2014) • Environmental Engineering by S. K. Dhameja; S. K. Kataria & Sons, 2009 • Environmental Science by Richard T Wright; Benjamin-Cummings Pub Co.
Articles	
References Books	Environmental Engineering by Howards S Peavy, Donald R Rowe, T. George • Environmental Science & Engineering by Gilbert M. Master • Environmental Chemistry by Stanley
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	1	1	-	1	-	-	-	-	-	-	-	3	2	3
CO4	2	2	-	2	1	-	-	-	-	-	-	-	2	3	3
CO5	2	2	-	2	1	-	-	-	-	-	-	-	2	2	3
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)** **CO2-** Apply the various networking concepts, topologies and remove deadlocks. (Apply).**(BL2-Understand)** **CO3-** Explain various memory management techniques and Analyze the concept of Sub-programs and blocks (Analysis)**(BL3-Apply)** **CO4-** Design the concept of software, operating system for better utilization of external system (Design)**(BL4-Analyze)** **CO5-** Evaluating the various algorithm, its solution and other communication techniques. (Investigation).**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG8(Decent work and economic growth) 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)** **CO2-** Understand the basic concept of the object-oriented programming **(BL2-Understand)** **CO3-** Apply the logic of oops in java **(BL3-Apply)** **CO4-** Able to Analyze inheritance and abstraction **(BL4-Analyze)** **CO5-** Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) 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)** **CO2-** Understand the Basic concept of Python Programming **(BL2-Understand)** **CO3-** Apply the concept of Python in ML **(BL3-Apply)** **CO4-** Analysis the use of built-in functions to navigate the file system**(BL4-Analyze)** **CO5-** Implement and evaluate the Python code in project **(BL5-Evaluate)** **CO6-** Appraise the need for working on web scraping **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	Analog & Digital Communication
Course Code	ECL0427

Part A

Year	2nd	**Semester**	4th	**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-** comprehensive knowledge of analog and digital communication;**(BL1-Remember)** **CO2-** understand the modulation and demodulation technologies and apply whenever essential.**(BL2-Understand)** **CO3-** have a practical experience of different communication technologies and can identify and analyze**(BL3-Apply)** **CO4-** practical experience of communication methods and evaluate different process.**(BL5-Evaluate)** **CO5-** develop different project based works and fond solutions**(BL3-Apply)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
1	Introduction:Overview of Communication system, Communication channels Need for modulation, Baseband and Pass band signals.Noise: Internal & External Noise, Signal to Noise ratio, Noise Figure, Calculation of Noise. Amplitude Modulation: Double side band with Carrier (DSB-C), Double side band without Carrier, Single Side Band Modulation, DSB-SC, SSB Modulators and Demodulators, Vestigial Side Band (VSB).	Talks and presentations	12
2	Angle Modulation: 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, FM noise suppression.	Talks and presentations	13
3	Pulse Modulation and Waveform Coding Techniques: Pulse Modulation Digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width modulation, Pulse Position Modulation. Their generation and Demodulation, Digital representation of Analog Signals, Pulse Code Modulation (PCM), PCM System, Differential Pulse Code Modulation.	Talks and presentations	11
4	Digital Modulation and Demodulation Techniques: Digital Data transmission, Line coding review, Pulse shaping, Scrambling, Digital receivers, Method of generation and detection of coherent & non- coherent binary ASK, FSK & PSK, Differential phase shift keying, quadrature modulation techniques. (QPSK and MSK), M-ary Digital carrier Modulation.	Talks and presentations	12
5	Information Theory & Coding: Information, entropies(Marginal and Conditional), Model of a communication system, Mathematical representation of source, channel and receiver characteristics, Mutual information, channel capacity, efficiency of noise free channel , Binary symmetric channel(BSC), Binary erasure channel(BEC), Shannon theorem, Shannon –Hartley Theorem, Shannon Fano and Huffman coding methods and their efficiency, Error control coding, Minimum Hamming distance, Linear block code, Cyclic code and Convolution codes.	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	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)** **CO2-** Enhance his linguistic and communicative abilities. **(BL3-Apply)** **CO3-** romote collaboration by cultivating an understanding of alternative perspectives.**(BL4-Analyze)** **CO4-** Stay updated on the most recent advancements in electrical engineering.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies) 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)** **CO2-** . Verify and examine the outcomes by utilizing various case studies.**(BL4-Analyze)** **CO3-** Make logical deductions and draw significant conclusions that are suitable for publication.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies) 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)** **CO2-** Verify and examine the outcomes by utilizing various case studies. **(BL5-Evaluate)** **CO3-** Make logical deductions and draw significant conclusions that are suitable for publication.**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG3(Good health and well-being) SDG4(Quality education) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG11(Sustainable cities and economies) 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	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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** To understand Static and rotating machines.**(BL2-Understand)** **CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)** **CO4-** To analyze the different numeric problems for well understand subjects problems.**(BL4-Analyze)** **CO5-** To evaluate and summarize the data using statistical & visualization tools.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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

<4d style="border: 1px solid black;">Experiments

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	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 M.G.Say Alternating Current Machines Pitman & Sons 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	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)** **CO2-** Able to understand different type of symmetrical and asymmetrical faults happened in power system**(BL2-Understand)** **CO3-** Able to understand stability of power system**(BL3-Apply)** **CO4-** Able to understand swing equations and equal area criterions**(BL4-Analyze)** **CO5-** Able to understand basics on power system protection system**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) 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)** **CO2-** Illustrate adequate knowledge in the time response of systems and steady state error analysis..**(BL2-Understand)** **CO3-** Examine the frequency-domain response of closed loop system.**(BL3-Apply)** **CO4-** Build a compensator system satisfying requirements. **(BL4-Analyze)** **CO5-** Analyze the stability of linear systems**(BL5-Evaluate)** **CO6-** Develop state models for linear time invariant system.							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) 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 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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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
					0	0	1	1
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** understand the scenario and structure of power system**(BL1-Remember)** **CO2-** set up the substation and its maintenance, power station maintenance **(BL2-Understand)** **CO3-** Predict the behavior of any electrical circuits, Formulate and solve complex Three phase AC circuits.**(BL5-Evaluate)** **CO4-** can evaluate the power generation value, transmission and distribution system capacity**(BL5-Evaluate)** **CO5-** Able to understand basics on power system protection system**(BL2-Understand)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) 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	To study Characteristics of solid state Over Voltage/Under Voltage Relay	Experiments	BL4-Analyze	2
2	To study Characteristics of Static Type over current Relay	Experiments	BL4-Analyze	2
3	UNDER VOLTAGE RELAY STATIC TYPE	Experiments	BL4-Analyze	2
4	TO STUDY IDMT OVER CURRENT RELAYS SINGLE PHASE AND TO DETERMINE THE PICKUP AND RESET VALUE.	Experiments	BL4-Analyze	2
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	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	1	1	-	1	-	1	-	-	-	-	1	1	1	1	3
CO2	1	1	1	-	1	1	-	1	-	-	1	1	2	2	1
CO3	1	-	1	1	1	-	1	-	-	-	1	-	1	1	1
CO4	1	1	1	1	1	1	1	-	-	-	1	1	2	1	3
CO5	1	1	1	-	1	1	1	-	-	-	1	-	2	2	3
CO6	1	1	1	1	1	-	1	-	-	-	-	1	3	2	1

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)** **CO2-** To understand the different components of power system protection and protection procedure of different high cost equipments in the system**(BL2-Understand)** **CO3-** set up the protection system transformer, generator, transmission line and other devices**(BL3-Apply)** **CO4-** To analyze the required components for a particular protection requirement**(BL4-Analyze)** **CO5-** To evaluate the fault and tripping of circuit in the fault case**(BL5-Evaluate)** **CO6-** To create a business continuity plan**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 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 T.K. Nagsarkar, M.S. sukhiz power system analysis oxford university press 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	Introduction of Electric Vehicle Technology
Course Code	EEL0132

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-** Identify EV concepts and parameters for better understanding of the EV technology**(BL1-Remember)** **CO2-** Analyze the EV Propulsion system for vehicular applications for their control.**(BL2-Understand)** **CO3-** Identify different energy sources used in EV.**(BL3-Apply)** **CO4-** Identify concepts of renewable energy sources**(BL4-Analyze)** **CO5-** Identify various alternative energy sources of energy.**(BL2-Understand)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG11(Sustainable cities and economies)				

Part B

Modules	Contents	Pedagogy	Hours
I	Introduction to transportation, Emissions from Vehicle, Evolution of e- mobility, EV Ecosystem and e-mobility in India, current demand in EV industry and opportunities of skilled EV engineers Past, Present & Future of EV, Current Major Issues, Recent Development Trends,	talks and presentations	8
II	Basic concepts related to EV, Types of Electric Vehicles in use today – Battery Electric Vehicle, Hybrid (ICE & others), Fuel Cell EV, Solar Powered Vehicles. Social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.	talks and presentations	9
III	Conventional and Non-conventional sources of energy Conventional energy sources. Non-conventional energy sources. Need of non-conventional energy sources. Renewable Sources of Energy such as Hydro, Solar, Wind, Biomass, Tidal and Geothermal - their availability and limitations.	talks and presentations, quiz	10
IV	Solar constants, Measurement of solar radiations, Solar Energy Conversion CSP generators, construction and working principle construction of a solar PV Systems: Solar cell, Module, Panel and array Types of solar PV system i. Stand –Alone Solar PV system ii. Grid-Interactive solar PV system iii. Hybrid Solar PV system Grid connection issues of solar power plants	talks and presentations, field visits	10
V	Indian & Global Scenarios in Electric Vehicles Technology Scenario, Market Scenario, Policies & Regulations, Payback & Commercial Model, Policies in India	talks and presentations	8

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
II	Study of electric vehicle system	Experiments	BL2-Understand	2
II	Study of hybrid electric vehicle system.	Experiments	BL4-Analyze	2
IV	Solar based EV Charging station.	Experiments	BL5-Evaluate	2
III	Electric Rickshaw Motor kit	Experiments	BL3-Apply	2
IV	Demonstration of battery management System	Experiments	BL4-Analyze	2
III	Demonstration of Brushless DC motor-based EV	Experiments	BL3-Apply	2
IV	To study about solar photo-voltaic system	Experiments	BL2-Understand	2
III	To study about solar lightning	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	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.Ali Emadi, “Advanced Electric Drive Vehicles”, CRC Press 2.Iqbal Husain, “Electric and Hybrid Vehicles – Design Fundamentals”, Second Edition, CRC Press.
Articles	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, 200
References Books	1.Alfred Rufer, “Energy Storage systems and components”, CRC Press
MOOC Courses	1.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 2.https://onlinecourses.nptel.ac.in/noc22_ee53/preview Electric Vehicles - Part 1 By Prof. Amit Jain | IIT Delhi
Videos	1.https://www.youtube.com/watch?v=CWulQ1ZSE3c 2.https://www.youtube.com/watch?v=UgtjRob5qMg&list=PLyqSpQzTE6M9spod-UH7Q69wQ3uRm5thr

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	-	-	-	-	-	1
CO3	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	-	1	-	-	-	-	2	-	-	-	-	-	-	1	-
CO5	2	-	1	-	-	-	-	-	1	1	-	-	-	-	-
CO6	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-

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)** **CO2-** Predict the behavior of any electrical circuits, Formulate and solve complex single phase AC circuits.**(BL2-Understand)** **CO3-** Predict the behavior of any electrical circuits, Formulate and solve complex Three phase AC circuits.**(BL3-Apply)** **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)** **CO5-** Predict the behavior of various measuring instruments in electrical engineering**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Describe battery basics and their types in EV and HEV.**(BL2-Understand)** **CO3-** Identify various types of electrical machines used in EV installation.**(BL3-Apply)** **CO4-** Describe Solar panel design and integration. **(BL4-Analyze)** **CO5-** Identify installation and commissioning of solar panel.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) 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)** **CO2-** • To find out different circuit parameters**(BL3-Apply)** **CO3-** • Implement theorems and logic in analysis of circuits**(BL3-Apply)** **CO4-** • Familiarize with steady state and transient analysis**(BL2-Understand)** **CO5-** Circuit implementation or design.**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** Discuss the various energy storage systems**(BL2-Understand)** **CO3-** Analyze the battery characteristics & parameters**(BL3-Apply)** **CO4-** Enlighten the battery management system**(BL5-Evaluate)** **CO5-** Apply the knowledge battery testing, disposal & recycling to avoid environmental pollution for the betterment of society**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) 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

M

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)** **CO2-** To explains about Boolean operations and different logic gates**(BL2-Understand)** **CO3-** to understand and explains about the concept of data processing circuits like encoder, decoder, multiplexer and demultiplexer**(BL3-Apply)** **CO4-** to understand about the types of latches and flip-flops**(BL2-Understand)** **CO5-** to design different electronics circuits**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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
					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)** **CO2-** Predict the behavior of three phase transformer**(BL2-Understand)** **CO3-** Predict the behavior of electro mechenical energy conversion**(BL3-Apply)** **CO4-** Predict the behavior of DC machine**(BL4-Analyze)** **CO5-** Predict the behavior of DC motor**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 Electrical Machinery, P.S. Bhimbra, 6/e, Khanna Publishers 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 M.G. Say, “The Performance and Design of AC machines”, Pit man & Sons. 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 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 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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Construct the watt-meter and energy meter to measure power and energy.**(BL2-Understand)** **CO3-** Construct instrumentation transformer to measure high values of current and voltage.**(BL3-Apply)** **CO4-** Analyze the bridges for the measurement of low, medium and high resistance. **(BL4-Analyze)** **CO5-** Analyze the bridges for the measurement of inductance and capacitance measurement;**(BL5-Evaluate)** **CO6-** Construct the potentiometers to measure AC and DC values of unknown voltage**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** set up the substation and its maintenance, power station maintenance **(BL2-Understand)** **CO3-** the load flow, volume calculation of conductor and the components required in power system**(BL3-Apply)** **CO4-** can evaluate the power generation value, transmission and distribution system capacity**(BL4-Analyze)** **CO5-** create a business continuity plan**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG7(Affordable and clean energy) 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)** **CO2-** to understand the 8086 MICROPROCESSOR and its ARCHITECTURE **(BL2-Understand)** **CO3-** to understand the INSTRUCTION SET OF 8086**(BL2-Understand)** **CO4-** to understand INTERFACING DEVICEs**(BL2-Understand)** **CO5-** to understand different INTERFACING AND APPLICATION OF 8085 MICROPROCESSOR **(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ 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)** **CO2-** Identify the electrostatic boundary-value problems by application of Poisson's and Laplace's equations**(BL2-Understand)** **CO3-** Understand the depth of static and time-varying electromagnetic field as governed by Maxwell's equations.**(BL3-Apply)** **CO4-** Formulate and analysis problems involving lossy media with planar boundaries using uniform plane waves.**(BL4-Analyze)** **CO5-** Apply concepts of this subject in Antenna Engineering and its applications**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To know the various electric drive concepts**(BL2-Understand)** **CO3-** To have a knowledge of DC drive mechanism.**(BL3-Apply)** **CO4-** To have a knowledge of AC drive mechanism.**(BL4-Analyze)** **CO5-** To understand about drives for special electrical machines**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) 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	0	4
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)** **CO2-** Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields.**(BL2-Understand)** **CO3-** Formulate and analyze a power electronic design at the system level and assess the performance.**(BL4-Analyze)** **CO4-** Acquire knowledge about different AC voltage controllers and their control.**(BL5-Evaluate)** **CO5-** Study the basics of Cyclo converters. **(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 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)** **CO2-** Analyze the I-V characteristics of SCR, DIAC and TRIAC. **(BL4-Analyze)** **CO3-** Analyze the characteristics of MOSFET, IGBT and UJT.**(BL4-Analyze)** **CO4-** Illustrate the functioning of rectifiers and firing circuits.**(BL5-Evaluate)** **CO5-** Distinguish the speed control of DC motor using converters.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG7(Affordable and clean energy) 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)** **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)** **CO3-** Understand vehicle dynamics for use in design and performance of ground vehicles**(BL2-Understand)** **CO4-** Transform solid models into dynamic models of vehicles for analysis of kinematics, (velocities and accelerations), kinetics (forces and moments).**(BL3-Apply)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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
					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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG7(Affordable and clean energy) 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	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)** **CO2-** To explain dynamics and modes of operation of electric drives. **(BL2-Understand)** **CO3-** To explain selection of motor power ratings and control of dc motor using rectifiers.**(BL3-Apply)** **CO4-** To analyze the performance of induction motor drives under different conditions .**(BL4-Analyze)** **CO5-** To explain the control of induction motor, synchronous motor and stepper motor drives.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG7(Affordable and clean energy) 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	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)** **CO2-** To understand Generation, Measurement and testing of high voltage.**(BL2-Understand)** **CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)** **CO4-** To analyze the different numeric problems for well understand subjects problems.**(BL4-Analyze)** **CO5-** To evaluate and summarize the data using statistical & visualization tools.**(BL5-Evaluate)** **CO6-** To prepare the models based on of real world problems of high voltage. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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. Dr. M.P. Chourasia High Voltage Engineering Khanna Publisher Delhi. 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)** **CO2-** To understand illumination, heating, welding , electrolysis and traction system.**(BL2-Understand)** **CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)** **CO4-** To analyze the different numeric problems for well understand subjects problems.**(BL4-Analyze)** **CO5-** To evaluate and summarize the data using statistical & visualization tools;**(BL5-Evaluate)** **CO6-** To prepare the models based on of real world problems utilization. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG7(Affordable and clean energy) 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 Gupta, J.B. Utilization of Electrical Energy S.K. Kataria & Sons 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)** **CO2-** To know the importance of frequency control**(BL2-Understand)** **CO3-** To analyze different methods to control reactive power**(BL3-Apply)** **CO4-** To understand unit commitment problem and importance of economic load dispatch**(BL4-Analyze)** **CO5-** To understand real time control of power systems **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) SDG11(Sustainable cities and economies) 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**()** **CO2-** to learn Laplace-Transform (LT) and Z-transform (ZT)**()** **CO3-** to learn Fourier Transforms (FT)**()** **CO4-** to understand different linear and nonlinear system**()** **CO5-** to understand different signals**()**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To set up the digital protection systems for transformer, generator, transmission line and other devices**(BL2-Understand)** **CO3-** To analyze and select the particular digital components for a particular protection requirement**(BL3-Apply)** **CO4-** To evaluate the fault and tripping time of circuit in the fault case**(BL4-Analyze)** **CO5-** To create a business continuity plan**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 Rabindranath and M Chander Switchgear and protection
Articles	
References Books	L.P.Singh, Digital Protection Wiley Eastern Ltd, Badri Ram & D.N. Vishwakarma, Power system Protectin & Switchgear TMH Publishing Company Ltd. New Delhi 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)** **CO2-** Design overall transformer**(BL2-Understand)** **CO3-** Estimate the performance characteristics of Transformer with the constraints specified.**(BL3-Apply)** **CO4-** Design Stator core & stator winding of an Induction motor. **(BL4-Analyze)** **CO5-** Design rotor core & rotor winding of an induction motor & calculate load current & other performance characteristics **(BL5-Evaluate)** **CO6-** Design overall dimensions of synchronous machine & cooling of synchronous generator**(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) 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 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 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)** **CO2-** to learn on SCADA system components**(BL2-Understand)** **CO3-** to learn on SCADA Architecture**(BL2-Understand)** **CO4-** to learn on SCADA Communication methods**(BL2-Understand)** **CO5-** to learn on Operations and controls of interconnected power system**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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. 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**()** **CO2-** to learn design of distribution system**()** **CO3-** to learn on power quality and its overview**()** **CO4-** to learn on different maintenance systems**()** **CO5-** to learn on ISO 9000 and TQM**()**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **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)** **CO3-** To understand efficient heat & electricity utilization, saving and recovery in different thermal and electrical system.**(BL3-Apply)** **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)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✓ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG7(Affordable and clean energy) 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. 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 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)** **CO2-** To understand Industrial utilization, Power quality and maintenance.**(BL2-Understand)** **CO3-** To implement Flow charts and practice set to understand the subject.**(BL3-Apply)** **CO4-** To analyze the different numeric problems for well understand subjects problems**(BL4-Analyze)** **CO5-** To evaluate and summarize the data using statistical & visualization tools.**(BL5-Evaluate)** **CO6-** To prepare the models based on of real world problems of power quality. **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) 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 Murphy M. D., and Tumbuli F Power Electronic Control of AC Motors Pergamon Press, Oxford University Press 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)** **CO2-** Understand the realization of over current, distance and differential relays using comparators.**(BL2-Understand)** **CO3-** Realize the various dynamic characteristics of digital relays for protection of transmission lines, transformers**(BL3-Apply)** **CO4-** Analyze different Protection schemes of bus bar and transmission lines.**(BL4-Analyze)** **CO5-** Identify the new developments in Digital Protection.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG4(Quality education) SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure) 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. 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 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	Distributed Generation System
Course Code	EEM0819

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-** Acquire the knowledge of evolution of smart grid, need of smart grid. Awareness about the national and the international policies undertaken in order to adopt smart grid concept worldwide.**(BL1-Remember)** **CO2-** Comprehend the acquaintance of intelligent electronic devices and their application in monitoring and protection. Understanding advantages and challenges of latest smart storage devices like SMES, pumped hydro storage and compressed air energy storage. Use of PMU and WAMS in modern power system analysis.**(BL2-Understand)** **CO3-** Understand the concept of real time pricing, automatic meter reading, outage management system. Identification of challenges and opportunities in advanced metering infrastructure and cyber security in smart grid.**(BL3-Apply)** **CO4-** Identification of power quality issues in grid connected renewable energy sources. Acquiring the knowledge of power quality conditioners and importance of power quality audit.**(BL4-Analyze)** **CO5-** Comprehend the acquaintance of micro grid and applications of micro grid. Understanding of thin solar films, variable speed wind generator, fuel cell and micro turbines in smart grid.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	DISTRIBUTED GENERATION: Energy Sources and their availability -trends in energy consumption, conventional and non-conventional energy sources – review of solar photovoltaic – wind energy systems – fuel cells, energy storage systems: batteries – ultra capacitors – fly wheels – captive power plants. Distributed generation – concept and topologies, renewable energy in distributed generation. IEEE 1547 Standard for interconnecting distributed generation to electric power systems – DG installations – siting and sizing of DGs – optimal placement – regulatory issues	Talks and presentations	12
Unit-2	ISSUES IN GRID INTEGRATION OF DISTRIBUTED ENERGY RESOURCES: Basic requirements of grid interconnections – operational parameters – voltage, frequency and THD limits – grid interfaces – inverter based DGs and rotary machines based DGs – reliability, stability and power quality issues on grid integration – impact of DGs on protective relaying and islanding issues in existing distribution grid.	Talks and presentations	13
Unit-3	MICROGRIDS: Introduction to microgrids – types – structure and configuration of microgrids – AC and DC micro-grids – power electronic interfaces for microgrids – energy management and protection control strategies of a micro-grid - case studies.	Talks and presentations	11
Unit-4	CONTROL OF MICROGRID: Modes of operation and control of microgrid: grid connected and islanded mode, active and reactive power control, protection issues, anti-islanding schemes: passive, active and communication based techniques	Talks and presentations	10
Unit-5	OPERATION OF MICROGRID- Microgrid communication infrastructure, power quality issues in microgrids, regulatory standards, microgrid economics, and introduction to smart microgrids.	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. Essentials of Distributed Generation Systems,Gregory W. Massey, Jones & Bartlett Publishers. 2. Integration of Distributed Generation in the Power System Math H. Bollen, John Wiley & Sons
Articles	
References Books	3. Distributed Generation,N. Jenkins, Nicholas Jenkins, IET Press Rich E and Knight K, “Artificial Intelligence”, TMH, New Delhi. 4. Microgrids and Active Distribution Networks,S. Chowdhury, P. Crossley, IET Press. 5. Design of Smart Power Grid Renewable Energy Systems,Ali Keyhani, John Wiley & Sons
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	-	-	-	1	-	-	-	2	3	-
CO2	3	-	2	2	1	-	2	-	1	-	-	-	1	-	2
CO3	1	2	1	2	2	1	-	1	-	-	-	-	3	1	-
CO4	2	2	2	1	-	-	1	-	-	1	-	-	1	2	1
CO5	2	1	1	1	3	-	2	-	2	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BTech-ElectricalEngineering

Title of the Course	Generalized Theory of Electrical Machines
Course Code	EEM0820

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-** Recall and describe the fundamental principles, operating mechanisms, and classifications of various electrical machines, including transformers, synchronous machines, and induction motors.**(BL1-Remember)** **CO2-** Explain the theoretical concepts behind the electromagnetic fields, torque production, and energy conversion processes in electrical machines.**(BL2-Understand)** **CO3-** Apply analytical techniques and mathematical models to solve problems related to the performance, efficiency, and control of electrical machines in practical applications. **(BL3-Apply)** **CO4-** Analyze the characteristics and performance parameters of different types of electrical machines under various loading and operating conditions, identifying factors affecting their efficiency and stability.**(BL4-Analyze)** **CO5-** Design and optimize electrical machine systems, integrating principles of machine theory, power electronics, and control strategies to meet specified industrial and commercial requirements.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Review : Primitive machine, voltage and torque equation. Concept of transformation changes of variables & m/c variables and transform variables. Application to D.C. machine for steady state and transient analysis, and equation of cross field commutator machine.	Talks and presentations	12
Unit-2	Induction Machine: Voltage, torque equation for steady state operation, Equivalent circuit, Dynamic performance during sudden changes in load torque and three phase fault at the machine terminals. Voltage & torque equation for steady state operation of 1-ö induction motor & scharge motor.	Talks and presentations	13
Unit-3	Synchronous Machine : Transformation equations for rotating three phase windings, Voltage and power equation for salient and non salient alternator, their phasor diagrams, Simplified equations of a synchronous machine with two damper coils.	Talks and presentations	11
Unit-4	Operational Impedances and Time Constants of Synchronous Machines: Park's equations in operational form, operational impedances and G(P) for a synchronous machine with four Rotor Windings, Standard synchronous machine Reactance, time constants, Derived synchronous machine time constants, parameters from short circuit characteristics.	Talks and presentations	10
Unit-5	Approximate Methods for Generator & System Analysis : The problem of power system analysis, Equivalent circuit & vector diagrams for approximate calculations, Analysis of line to line short circuit, Application of approximate method to power system 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. P.C.Krause, Analysis of Electric Machinery, Wiley India. 2. B.Adkins, The General theory of Electrical Machines.
Articles	
References Books	1 B.Adkins & R.G.Harley, The General theory of AC Machines. 2 P.S.Bhimbra, Generalised theory of Electrical m/c 3 White & Woodson, Electro Mechanical Energy Conversion.
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	-	-	3	-	1	-	1	2	1	1
CO2	3	3	2	2	1	1	-	-	-	-	1	1	1	2	2
CO3	2	2	-	2	2	-	1	-	1	1	1	-	2	1	2
CO4	1	1	1	1	3	2	-	-	-	-	1	1	1	2	1
CO5	1	1	1	-	-	-	2	-	-	1	-	1	1	1	1
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BTech-ElectricalEngineering

Title of the Course	industrial instrumentation
Course Code	EEM0821

Part A

					L	T	P	C
Year	4th	**Semester**	8th	**Credits**	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)** **CO2-** Describes the working of RTD, Thermostats, and thermocouple.**(BL2-Understand)** **CO3-** Describes the Bourdon tube, diaphragms and Bell gauges for pressure measurement and to employ flapper-nozzle assembly for differential pressure measurement.**(BL3-Apply)** **CO4-** Describes the various flow and level measurement devices used for industrial purposes.**(BL4-Analyze)** **CO5-** Elucidate the construction and working of various industrial devices used to measure pressure, sound and flow**(BL5-Evaluate)** **CO6-** Illustrate measurement techniques for acceleration, vibration and density **(BL6-Create)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) SDG4(Quality education) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) 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. 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 D. Patranabis Principle of Industrial Instrumentation by Patranabis TMH , New Delhi. 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)** **CO2-** Acquire the knowledge about the properties of bundled conductors**(BL2-Understand)** **CO3-** Understand about the various conventional and advanced compensation devices.**(BL3-Apply)** **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)** **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 ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG7(Affordable and clean energy) 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	HVDC
Course Code	EEM0823

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-** To understand Generation of High Voltage**(BL1-Remember)** **CO2-** To learn and understand High Voltage Measurement**(BL2-Understand)** **CO3-** To know Industrial application of High Voltage Engineering**(BL3-Apply)** **CO4-** Analyze the operational characteristics and performance of HVDC systems under various conditions, including fault scenarios, and propose solutions to mitigate potential issues.**(BL4-Analyze)** **CO5-** To Evaluate High Voltage Test & Specifications**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Generation of High Voltage: Different methods of Generation of A.C., D.C., and Impulse High Voltage, Circuits for double exponential Impulse and switching surge Generation fast Switching, Analysis of Impulse waveform and Generator efficiency.	Talks and presentations	12
Unit-2	High Voltage Measurement: Review of Measurement methods, Electrostatic Voltmeter Compensated Dividers at power frequency, Divider for Impulse waveform, Divider at power frequency. Divider compensation critical High Voltage and current measurement, Optical signal links.	Talks and presentations	13
Unit-3	Industrial application of High Voltage Engineering: Electrostatic precipitator, spraying of liquid and power coating, Mineral Separation, Electrostatic Precipitation and printing Electrostatic hazards, Electron Microscope, X-ray Generation, Pulse power application, High power Electron beams for melting, welding etc, Application in space vehicles, Medical applications. Insulation Engineering.	Talks and presentations	12
Unit-4	Concepts of Electric stress, Dielectric Electric strength, Electric breakdown in vacuum, Gases, Liquids, Solids and dielectrics, testing in Solids, Insulation system in bushing, Transformers, Cables, Capacitors and Circuit breakers. Techniques of Electrical non-destructive evaluation of Material breakdown tests and measurement.	Talks and presentations	11
Unit-5	High Voltage Test & Specifications: Over voltage tests, Impulse test and routines interference test, Partial Discharge test, Test methods, Test on H.V.D.C. Equipment. High Voltage Switchgears: HVDC breakers, Harmonic Capacitors Switches, EHV Disconnecting switches, Corona and Corona losses, Earthing and Shielding of EHV System	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**

Part E

Books	High voltage Engineering by Dr. M.P. Chourasia Khanna Publisher Delhi. 2. High voltage Engineering by E. Kuffel & W.S. Zaengl, J. Kuffel, Newnes , New Delhi.
Articles	
References Books	High voltage Engineering by M.S. Naidu, V. Kamraju Tata McGraw Hill, New Delhi. 4. High voltage Engineering by C.L. Wadhwa, New Age International Ltd. Publisher ,New Delhi. 5. An Introduction to High Voltage Engineering by Subir Ray, Prentice Hall of India 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	3	2	-	1	1	-	3	3	-	-	2	-	1	2	2
CO2	3	2	1	2	-	2	1	3	2	2	-	-	1	3	2
CO3	3	1	3	-	1	2	-	1	2	-	2	-	1	2	3
CO4	2	2	1	3	-	2	1	-	-	1	-	-	1	-	3
CO5	1	1	1	3	3	-	-	3	2	-	-	-	1	3	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus-2023-2024

BTech-ElectricalEngineering

Title of the Course	Smart Grid and Energy Management
Course Code	EEM0824

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-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✓ Employability ✓ Professional Ethics ✓ Gender ✓ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure)				

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. Stuart Borlase “Smart Grid Infrastructure Technology and Solutions”, CRC Press; 2nd edition. 2. James Momoh, “Smart Grid: Fundamentals of Design and Analysis”, Wiley, 2012. 3. S. Chowdhury, “Microgrids and Active Distribution Networks.” Institution of Engineering and Technology, 2009.
Articles	
References Books	4. Janaka Ekanayake, Kythira Liyanage, Jianzhong Wu, Akihiko Yokohama, Nick Jenkins- “Smart Grids Technology and Applications”, Wiley, 2012. 5. Clark W.Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press. 6. Jean Claude Sabonnadière, Nouredine Hadjsaïd, “Smart Grids”, 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	3	1	1	-	1	3	-	1	-	-	1	-	1
CO2	3	1	2	2	-	1	1	-	-	1	-	-	1	1	1
CO3	2	1	3	2	1	1	2	1	1	-	-	-	-	1	1
CO4	2	1	2	1	-	1	3	-	1	1	-	-	1	1	1
CO5	1	1	1	2	1	-	1	1	-	-	-	-	1	-	1
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-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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 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-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG5(Gender equality) SDG7(Affordable and clean energy) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) 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-** Measurement standards and its units**(BL1-Remember)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure) 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	Communication Skills & Colloquim
Course Code	HUL0101[P]

Part A

Year	1st	**Semester**	1st	**Credits**	L	T	P	C
					3	0	1	4
Course Type	Embedded theory and lab							
Course Category	Humanities, Social Sciences and Management							
Pre-Requisite/s	Student must have knowledge about Language proficiency.			**Co-Requisite/s**	Developed Communication skill.			
Course Outcomes & Bloom's Level	**CO1-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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	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-ElectricalEngineering

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	Humanities, Social Sciences and Management							
Pre-Requisite/s	The students have a basic knowledge and understanding of the English language and communication.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG4(Quality education) SDG5(Gender equality) SDG10(Reduced inequalities)				

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

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	Mishra. B, Sharma. S Communication Skills for Engineers and Scientists
Articles	Rizvi, M.A. Academic Writing: A course in English for Science and Technology, Nabodaya Prakashak , Calcutta
References Books	Pal, Rajendra and Korlahalli, J.S. Essentials of Business Communication
MOOC Courses	https://onlinecourses.nptel.ac.in/noc21_hs76/preview
Videos	Markel, Michael, Technical Writing: Situations and Strategies: St. Martin's Press

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-ElectricalEngineering

Title of the Course	Environmental Pollution and global issues
Course Code	MCL0201

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s	Basic knowledge of natural resources, biodiversity, ecological succession, energy flow, environmental issues and problems.			**Co-Requisite/s**	A detailed understanding of the complexity of environment and its challenges and solutions to these problems and challenges.			
Course Outcomes & Bloom's Level	**CO1-** Measurement standards and its units**(BL1-Remember)** **CO2-** Measurement methods and characteristics of measurements**(BL2-Understand)** **CO3-** Calibration procedures and methods of calibration**(BL3-Apply)** **CO4-** Installation and commissioning of indoor and outdoor equipment.**(BL4-Analyze)** **CO5-** Testing of new & Old electrical installation as per IS **(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✓		**SDG (Goals)**	SDG2(Zero hunger) SDG3(Good health and well-being) SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG8(Decent work and economic growth) SDG10(Reduced inequalities) SDG11(Sustainable cities and economies) SDG12(Responsible consuption and production) SDG13(Climate action) SDG14(Life below water) SDG15(Life on land) SDG16(Peace Justice and strong institutions) SDG17(Partnerships for the 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		60	30	40	20
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
	0				

Part E

Books	Environmental Science by B. S. Chauhan; Firewall Media, 2008 • Environmental Science by Cuningham and Cuningham; McGraw-Hill Education; 13th edition (16 February 2014) • Environmental Engineering by S. K. Dhameja; S. K. Kataria & Sons, 2009 • Environmental Science by Richard T Wright; Benjamin-Cummings Pub Co.
Articles	
References Books	Environmental Engineering by Howards S Peavy, Donald R Rowe, T. George • Environmental Science & Engineering by Gilbert M. Master • Environmental Chemistry by Stanley
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	1	1	-	1	-	-	-	-	-	-	-	3	2	3
CO4	2	2	-	2	1	-	-	-	-	-	-	-	2	3	3
CO5	2	2	-	2	1	-	-	-	-	-	-	-	2	2	3
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)** **CO2-** To understand the mechanism of metal forming.**(BL2-Understand)** **CO3-** To implement the different metal forming operations to deform the parts.**(BL3-Apply)** **CO4-** To analyze the different parameters used in metal forming.**(BL4-Analyze)** **CO5-** To evaluate different forces which act during the operations.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 R. K. Jain Production Technology Khanna Publishers, 2001
Articles	
References Books	P. C. Pandey Production Engineering Science Standard Publishers, 2010 P. N. Rao Manufacturing Technology Mc Graw Hill, 2001 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	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)** **CO2-** Understand the basics of Python like python origin downloading and installing and basic concept of python**(BL2-Understand)** **CO3-** Apply the various conditional and looping statement and functional programming.**(BL3-Apply)** **CO4-** Explain various objects numbers and sequence in python Analyze the concept of regular expression.**(BL4-Analyze)** **CO5-** Evaluate the concept of object-oriented programming for better utilization of language.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG2(Zero hunger) 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	Environmental Pollution and global issues
Course Code	MCL0201[T]

Part A

Year	1st	**Semester**	2nd	**Credits**	L	T	P	C
					3	1	0	4
Course Type	Theory only							
Course Category	Foundation core							
Pre-Requisite/s	Basic knowledge of natural resources, biodiversity, ecological succession, energy flow, environmental issues and problems.			**Co-Requisite/s**	A detailed understanding of the complexity of environment and its challenges and solutions to these problems and challenges.			
Course Outcomes & Bloom's Level	**CO1-** CO1. Develop environmental scientists and engineers and sensitize them towards environmental issues. **(BL2-Understand)** **CO2-** CO2. To acquire analytical skills in assessing environmental impacts through a multidisciplinary approach**(BL3-Apply)** **CO3-** CO3. Ability to distinguish between various methods of various pollution analysis**(BL4-Analyze)** **CO4-** CO4.Acquire expertise and skills needed for the Environmental Management Systems and techniques of monitoring, Environment audit, Environmental Impact Analysis, environment instrumentation and control systems and for the projects development, implementation, and maintenance.**(BL5-Evaluate)** **CO5-** CO5. Students acquire skills for to communicate, prepare, plan and implement the environmental management project**(BL6-Create)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✓ Gender ✕ Human Values ✓ Environment ✓		**SDG (Goals)**	SDG5(Gender equality) SDG6(Clean water and sanitation) SDG7(Affordable and clean energy) SDG12(Responsible consuption and production) SDG13(Climate action) SDG15(Life on land)				

Part B

Modules	Contents	Pedagogy	Hours
1 (Environment, Ecosystem and Environmental Education)	Environment – Definition and its segments, (Lithosphere, Hydrosphere, Atmosphere and Biosphere), Multidisciplinary nature of Environmental Science, Ecology and Ecosystem: Basic concepts, functions of ecosystem, Energy Flow, Food chain, food web, Ecological Pyramids, Ecological Successions. Environmental Education- Definition, scope, importance, Need for Public Awareness, Environmental Ethics. Environmental Impact Assessment: Screening, Scoping, Base line Analysis, Impact Mitigation, Documentation, Review, Public hearing, Post Project Monitoring.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, discussion (questions & answers section)	8
2 (Natural Resources Management)	Natural Resources – Classification, Water Resources (availability, quality, water budget), Mineral Resources (distribution, availability and future perspectives), and Forest Resources. Energy Resources- Classification and alternatives of conventional energy resources- Solar, working of solar photovoltaic cells, Geothermal, Wind energy, Nuclear Energy, Biomass and Bio-gas	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
3 (Water, Soil & Noise Pollution)	Water pollution – sources & effects, characteristics and treatment of waste water, engineered systems for water purification: Aeration, solid separation, settling operations, filtration and disinfection. Soil - formation of soil, elementary and mineral composition, types of soil in India, soil pollution, effects and abatements. Noise Hazards: Continuous and impulse noise, Effect of noise on man, Measurement and evaluation of Noise, noise isolation and absorption techniques, silencers, practical aspects of noise.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion.	8
4 (Atmospheric chemistry and Air Pollution)	Classification, sources and toxic effects of air pollutants, dispersal of air pollutants, engineered systems for air purification: Atmospheric cleansing process, approaches to contamination control. Air pollutants with emphasis on reactive intermediates in atmosphere like hydroxyl radical, ozone and nitrate radical, types of hydrocarbon in the troposphere, reaction of organic compounds in the atmosphere.(Green house gas effect, Global warming, Climate change).	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures,Audio/Video clips, Group discussion.	8
5 (Waste Management)	Solid waste: Generation and waste characterization. Collection, storage and transport. Waste disposal, waste processing techniques, reduction, reuse and recycling, resource recovery and utilization. Physical and chemical treatment methods and composting. Hazardous waste management and treatment.	Lecture with ppt., Diagrams, Flowchart depiction on whiteboard during online/offline lectures, Audio/Video clips, Group discussion. Field visits. Industrial Visit (MSW/BMW/STP/ETP)	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	Environmental Science by B. S. Chauhan; Firewall Media, 2008 • Environmental Science by Cuningham and Cuningham; McGraw-Hill Education; 13th edition (16 February 2014) • Environmental Engineering by S. K. Dhameja; S. K. Kataria & Sons, 2009 • Environmental Science by Richard T Wright; Benjamin-Cummings Pub Co.
Articles	
References Books	Environmental Engineering by Howards S Peavy, Donald R Rowe, T. George • Environmental Science & Engineering by Gilbert M. Master • Environmental Chemistry by Stanley
MOOC Courses	https://onlinecourses.swayam2.ac.in/cec21_ge08/preview
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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)** **CO2-** Identify the needs and problem of the community and involve them in problem solving. **(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem. **(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Identify the needs and problem of the community and involve them in problem solving. **(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem. **(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Identify the needs and problem of the community and involve them in problem solving. **(BL2-Understand)** **CO3-** Utilize their knowledge in finding practical solution to individual and community problem. **(BL3-Apply)** **CO4-** Develop the confidence require for group living and sharing of responsibilities of acquire leader ship qualities and democratic attitudes. **(BL4-Analyze)** **CO5-** Develop the capacity to meet emergencies and natural disasters and practice national integration and social harmony**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To increase their mental ability.**(BL3-Apply)** **CO3-** To inculcate the ability to express innovative opinion and thoughts**(BL4-Analyze)** **CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To increase their mental ability.**(BL3-Apply)** **CO3-** To inculcate the ability to express innovative opinion and thoughts.**(BL4-Analyze)** **CO4-** To have Dissertation works as skills development in students. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To increase their mental ability.**(BL3-Apply)** **CO3-** To inculcate the ability to express innovative opinion and thoughts.**(BL4-Analyze)** **CO4-** To have Dissertation works as skills development in students.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✗ Gender ✗ Human Values ✗ 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	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)** **CO2-** To understand fundamental concepts of electric vehicle propulsion systems**(BL2-Understand)** **CO3-** To implement advanced control strategies for optimizing electric vehicle efficiency and performance.**(BL3-Apply)** **CO4-** To analyze the performance characteristics of electric vehicle components**(BL4-Analyze)** **CO5-** To evaluate the impact of electric vehicles on sustainability and the environment**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** Understand the difference between initial value and boundary value problems.**(BL2-Understand)** **CO3-** Apply solution algorithms like Jacobi iterative and Gauss-Seidel methods to solve elliptic equations.**(BL3-Apply)** **CO4-** Analyze the computational challenges associated with solving Navier-Stokes equations for incompressible fluid flow**(BL4-Analyze)** **CO5-** Synthesize theoretical concepts with computational methods to devise strategies for enhancing stability and accuracy in numerical simulations.**(BL5-Evaluate)** **CO6-** Evaluate the practical applicability and effectiveness of computational simulations in addressing engineering challenges related to fluid mechanics and heat transfer accurately.							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG1(No poverty) SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) 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 Anderson, Jr, J. D. (1995). Computational Fluid Dynamics. McGraw Hill Education. 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. 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. 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)** **CO2-** 2. Analyze the inverse manipulator kinematics and dynamics.**(BL2-Understand)** **CO3-** 3. Gain the knowledge about the manipulator design and mechanism.**(BL3-Apply)** **CO4-** 4. Elucidate the role of actuators, drive systems and sensors in robotics.**(BL4-Analyze)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 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)** **CO2-** Describe the significance of alternative fuels over conventional fuels**(BL2-Understand)** **CO3-** Test the fuels in various engines**(BL3-Apply)** **CO4-** Analyze the performance of an engine under standard conditions with a specific alternative fuel**(BL4-Analyze)** **CO5-** Evaluate the various alternative fuels and their suitability with a specific engine and environment**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) 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

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 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)** **CO2-** To comprehend and classify the behavior of different types of sensors**(BL2-Understand)** **CO3-** To implement the data acquisition systems with different sensors for real-time applications.**(BL3-Apply)** **CO4-** To conduct experiments and measurements in laboratory and realize hands-on experience on real components, sensors and actuators.**(BL4-Analyze)** **CO5-** To evaluate and realize the trends in sensor technology, industrial network and automation.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** To understand the mechanism of production processes.**(BL2-Understand)** **CO3-** To implement the different metal forming operations to deform the parts.**(BL3-Apply)** **CO4-** To analyze the different parameters used in production processes.**(BL4-Analyze)** **CO5-** To evaluate different forces which act during the operations.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** To describe the significance of group technology and cellular manufacturing. **(BL2-Understand)** **CO3-** To apply the basics of CAD and CAM in the methodology of CAPP and FMS.**(BL3-Apply)** **CO4-** To analyze the PPC and Production scheduling. **(BL4-Analyze)** **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 ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Understand the basics fests of design of Non destructive testing**(BL2-Understand)** **CO3-** Apply system of testing.**(BL3-Apply)** **CO4-** Analyze the system of testing defect.**(BL4-Analyze)** **CO5-** Evaluate the various testing and forgings for strengthening the products**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements. **(BL2-Understand)** **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)** **CO4-** Analyse element characteristic equation and generation of global equation**(BL4-Analyze)** **CO5-** Develop element characteristic equation and generation of global equation. **(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** 2. To describe the project organization and cost estimation.**(BL2-Understand)** **CO3-** 3. To develop the blueprint of the project.**(BL3-Apply)** **CO4-** 4. To analyze the financial aspects of the project.**(BL4-Analyze)** **CO5-** 5. To evaluate the project planning and modification of the network models.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** 2. To describe the production planning and control.**(BL2-Understand)** **CO3-** 3. To develop the planning of resources and operations.**(BL3-Apply)** **CO4-** 4. To analyze the financial aspects of the material procurement and maintenance management.**(BL4-Analyze)** **CO5-** 5. To evaluate the Production planning and master scheduling.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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)** **CO2-** 2. To understand the context of supervised and unsupervised learning through real-life examples.**(BL2-Understand)** **CO3-** 3. Apply all learning algorithms over appropriate real-time dataset.**(BL3-Apply)** **CO4-** 4. Evaluate the algorithms based on corresponding metrics identified.**(BL4-Analyze)** **CO5-** 5. Analyze the requirements of Machine Learning applications in context-aware robotic environment.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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

					L	T	P	C
Year	2nd	**Semester**	3rd	**Credits**	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)** **CO2-** To understand the concept of generalized measurement system**(BL2-Understand)** **CO3-** To apply the measurement of mechanical parameter such as pressure, force, torque, and strain in equipments**(BL3-Apply)** **CO4-** To analyze the error in measurement system and tolerance**(BL4-Analyze)** **CO5-** To evaluate the measurement of linear and angular measurement.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG4(Quality education) 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. 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. 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	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)** **CO2-** To understand the fundamental principles of additive manufacturing.**(BL2-Understand)** **CO3-** To apply appropriate material selection criteria for different additive manufacturing applications.**(BL3-Apply)** **CO4-** To compare and contrast different additive manufacturing processes based on their strengths and weaknesses**(BL4-Analyze)** **CO5-** To evaluate strategies for integrating additive manufacturing into existing manufacturing systems for improved efficiency and productivity.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure) 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, Gebhardt A Rapid prototyping Hanser Gardener Publications,
Articles	
References Books	Kamrani A.K. and Nasr E. A Rapid Prototyping: Theory and practice Springer 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)** **CO2-** CO2 Understand the basics of sciences in effects of system of forces on rigid bodies in static and kinetic conditions.**(BL2-Understand)** **CO3-** CO3 Apply system of forces in the belts drive systems as power transmission devices, shafts and beams.**(BL3-Apply)** **CO4-** CO4 Analyze the beams and trusses with centre of mass and moment of inertia.**(BL4-Analyze)** **CO5-** CO5 Evaluate shear force and bending moment in designing of shafts and beams and trusses.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** To describe the basic concept of casting and welding processes.**(BL2-Understand)** **CO3-** To implement basic knowledge in analyzing the forces and processes of welding and casting.**(BL3-Apply)** **CO4-** To analyze the welding and casting processes**(BL4-Analyze)** **CO5-** To evaluate and summarize the analysis in optimizing the casting and welding processes.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	Energy Conversion Systems
Course Code	MEL0411[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	Students should have fundamental knowledge of thermodynamics, basic mathematics and physic.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** Recall the concepts of Basic Thermodynamics**(BL1-Remember)** **CO2-** Understating the concept of Energy conversion systems**(BL2-Understand)** **CO3-** Applying the basic concept of Heat Transfer**(BL3-Apply)** **CO4-** Analyzing the working of boilers, turbines, condensers**(BL4-Analyze)** **CO5-** Evaluating the working of boilers, turbines, condensers**(BL5-Evaluate)**							
Coures Elements	Skill Development ✕ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Thermodynamic Relation: Thermodynamic Coordinates, Exact differentials, Mathematical conditions for exact differentials, Maxwell relations, Clausius Clayborn equation, its applications, Joule Thomson coefficient, Inversion curve, coefficient of volume expansion, adiabatic and Isothermal Compressibility	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-2	Boilers: Definition, Classification, working of fire tube and water tube Boilers, Natural and forced Draught, Chimney height calculation, Mountings and accessories Air Preheater, feed water heater, super heater, Boiler efficiency, equivalent evaporation, Boiler trial, heat balance sheet.	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-3	Steam nozzles: Flow through nozzles, variation of velocity, area and specific volume, conditions for maximum discharge, chocked flow, throat area, nozzle efficiency, effect of friction on nozzle, supe saturated flow. Condensers: Classification, Air leakage, performance, comparison, efficiency	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-4	Steam Engines and Turbines: Introduction of steam engines, Classification, working of steam engine, Indicator Diagram, Impulse and reaction turbine, staging, stage and overall efficiencies, reheat factor, Bleeding, velocity diagrams, simple impulse and reaction turbine, Work done, comparison with steam engines, losses in steam turbines, Governing of turbines, Vapour Power Cycles: Comparison of Carnot and Rankine cycles, Effect of pressure and temperature on Rankine cycle, Reheat cycle, Regenerative cycle	Lectures with white board/PPT, Quiz, Group discussion	8
Unit-5	Gas turbines: Gas turbines classification, Brayton cycle, principles of gas turbine, gas turbine cycles with intercooling, reheat, regeneration and their combinations, stage efficiency, polytrophic efficiency, deviation of actual cycles from ideal cycle.	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 Babcock and Wilcox Boiler	Experiments	BL4-Analyze	2
Experiment -2	Study of Fire Tube Boiler	Experiments	BL4-Analyze	2
Experiment -3	Study of Boiler Mountings	Experiments	BL4-Analyze	2
Experiment -4	Study of Accessories of Boiler Economizer	Experiments	BL4-Analyze	2
Experiment -5	Study of Other Mountings of the boiler	Experiments	BL4-Analyze	2
Experiment -6	Study of The Locomotive Boiler	Experiments	BL4-Analyze	2
Experiment -7	Study of The Pelton Wheel Turbine	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	D. Text Books P.K. Nag “Basic and Applied Thermodynamics” Tata MC Graw Hill.
Articles	
References Books	D. S. Kumar “Engineering Thermodynamics” First edition (June 2012)
MOOC Courses	https://onlinecourses.nptel.ac.in/noc23_ch76/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	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	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)** **CO2-** To understand the basic concept of metal cutting mechanism.**(BL2-Understand)** **CO3-** To implement the mechanism of machining in different machines.**(BL3-Apply)** **CO4-** To analyze the different parameters used in machining operations.**(BL4-Analyze)** **CO5-** To evaluate different forces which act during the machining.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 Dr. P. C. Sharma Manufacturing Technology-II S. Chand & Company Ltd.
Articles	
References Books	P. C. Pandey Production Engineering Science Standard Publishers, 2010 P. N. Rao Manufacturing Technology Vol. II Tata McGraw–Hill, New Delhi, 2009 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)** **CO2-** To understand the concept of design against static loading for mechanical components and suitable material for machine components.**(BL2-Understand)** **CO3-** To apply the concept of design against static loading for mechanical components**(BL3-Apply)** **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)** **CO5-** To evaluate the applications of Machine design in various fields such as research and industries**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG9(Industry Innovation and Infrastructure) 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. 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. Juvinall, R. C., & Marshek, K. M. (2011). Fundamentals of Machine Component Design (5th ed.). John Wiley & Sons. 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)** **CO2-** To understand the basic concept of thermodynamics, heat engines and air standard cycles.**(BL2-Understand)** **CO3-** To implement the knowledge of thermodynamics in determining the engine parameters.**(BL3-Apply)** **CO4-** To analyze the thermal efficiency of various cycles and cooling and lubrication systems.**(BL4-Analyze)** **CO5-** To evaluate the findings of analysis of supercharging, cooling and lubrication systems within permissible limits of pollutants.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** To Understand Components and operation; velocity triangles, work output**(BL2-Understand)** **CO3-** To apply fluid mechanics in Components and operation, velocity triangles and work output**(BL3-Apply)** **CO4-** To analyze Main elements and their functions; Various types and classification**(BL4-Analyze)** **CO5-** To evaluate new Components, working principle; pressure variations due to piston acceleration**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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	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)** **CO2-** Understating the concept of joints and links.**(BL2-Understand)** **CO3-** Applying the basic degree of freedom concept.**(BL3-Apply)** **CO4-** Determine the options of fixed or flexible automation.**(BL4-Analyze)** **CO5-** Determine the safe conditions of optimizing human and robots role.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ 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 remember the concepts of Machine Design, Solid mechanics, Machine drawing, Engineering Mechanics etc.**(BL1-Remember)** **CO2-** To understand the concept of design against static loading for mechanical components and suitable material for machine components.**(BL2-Understand)** **CO3-** To implement the concept of design against static loading for mechanical components**(BL3-Apply)** **CO4-** To analyse the safe dimensions of Gear, Clutch, IC Engine, Bearing and Brakes under the static and dynamic load.**(BL4-Analyze)** **CO5-** To evaluate the applications of Machine design in various fields such as research and industries.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit -1	Classification of gears, standard gear tooth system, nomenclature for spur, helical and bevel gears, gear standards, force analysis for spur, helical, and bevel gears, gear failure modes, bending and contact stresses in gear tooth, gear material selection, Lewis and Bukingham equations, design of spur, helical and bevel gears, general design procedure for a fixed ratio gearbox	lecture with ppt, Physical model of gear, quiz, Audio/Video clips, group discussion,	10
Unit -2	Sliding Contact Bearing: Types of lubrication-hydro dynamic, hydro static and EHD lubrication, plain journal bearing, Petroff's equation and the bearing characteristic number, boundary and film lubrication, pressure distribution-eccentricity and minimum film thickness, heat generation and thermal equilibrium, design procedure Rolling Contact Bearing: Types of ball and roller bearings, thrust ball bearing, selection of radial ball and roller bearings, bearing life, dynamic equivalent load, reliability of bearing, lubrication and mounting of bearings.	lecture with ppt, Understand the design of Bearing from Physical model bearing, Review Analysis Audio/Video clips, group discussion	6
Unit -3	General design considerations, design of cylinder and cylinder head, piston, connecting rod and crank shaft	lecture with ppt, classroom presentations, Audio/Video clips, group discussion	8
Unit -4	Friction clutches and brakes, uniform pressure and uniform wear assumptions, design of disc and cone types of clutches and brakes, design of external contracting and internal expanding elements, band type clutches and brakes, centrifugal clutches	lecture with ppt, classroom presentations, Audio/Video clips, group discussion	8
Unit -5	Drives: Belt Drives, Belt Constructions, Geometrical Relationships, Analysis of Belt Tension, Condition for Maximum Power, Chain Drives, Roller Chains, Geometric Relationships, Polygonal Effect, Power Rating of Roller Chain	lecture with ppt, classroom presentations, Audio/Video clips, group discussion	8

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. 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. Juvinall, R. C., & Marshek, K. M. (2011). Fundamentals of Machine Component Design (5th ed.). John Wiley & Sons. 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	Computer Aided Design
Course Code	MEL0722[T]

Part A

					L	T	P	C
Year	4th	**Semester**	7th	**Credits**	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 remember the concepts of basic computer, Machine drawing and Numerical Method, and computer graphics.**(BL1-Remember)** **CO2-** To Understating the concept of computer graphics**(BL2-Understand)** **CO3-** To implement the efficient way to drawing geometry in graphics software.**(BL3-Apply)** **CO4-** To analyse the different types of method to draw the 2D and 3D geometry**(BL4-Analyze)** **CO5-** To evaluate the applications of computer graphics in various fields such as research and industries.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG8(Decent work and economic growth) SDG12(Responsible consuption and production)				

Part B

Modules	Contents	Pedagogy	Hours
Unit -1	Introduction and elements of CAD, Essential requirements of CAD, Concepts and importance of integrated CAD/CAM, Engineering Applications, CAD/CAM systems, Graphics Input devices-cursor control Devices, Digitizers, Keyboard terminals, Image scanner, Speech control devices and Touch, panels, Graphics display devices-Cathode Ray Tube, Random and Raster scan display, Colour CRT monitors, Direct View Storage Tubes, Flat Panel display, Hard copy printers and plotters	lecture with PPT, quiz, Audio/Video clips, group discussion,	8
Unit -2	Graphics standards and software, Software Configuration, Graphics Functions, Output primitives- Bresenham's line drawing algorithm and Bresenham's circle generating algorithm. World/device Coordinate Representation, Windowing and clipping, 2-D Geometric transformations - Translation, Scaling, Shearing, Rotation & Reflection Matrix representation, Composite transformation, 3 - D transformations, multiple transformation.	lecture with PPT, quiz, Audio/Video clips, group discussion	8
Unit -3	Curves representation, Properties of curve design and representation, Interpolation v/s approximation, Parametric representation of analytic curves, Parametric continuity conditions, Parametric representation of synthetic curves- Hermite cubic splines - Blending function formulation and its properties, Bezier curves - Blending function formulation and its properties, Composite Bezier curves, B-spline curves and its properties, Periodic and non-periodic B-spline curves	lecture with PPT, quiz, Audio/Video clips, group discussion	8
Unit -4	Polygon mesh representations, Quadric and Super quadric surfaces and blobby objects; Solid modeling-Solid entities, Fundamentals of Solid modeling-Set theory, regularized set operations; Half spaces, Boundary representation, Constructive solid geometry, Sweep representation, Color models Application commands for various commercial software	lecture with PPT, quiz, Audio/Video clips, group discussion	8
Unit -5	Numerical Methods: Introduction, Errors in numbers, Binary representation of numbers, Root finding-Bisection method, Newton-Raphson method, Curve fitting-Least square method, Numerical differentiation-Newton's interpolation, Numerical Integration-Trapezoidal and Simpson method	lecture with PPT, quiz, Audio/Video clips, group discussion	8

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 Zeid, I. (2016). Mastering CAD/CAM. McGraw-Hill Education.
Articles	
References Books	Kularatne, D., & Wijesundara, S. (2017). Computer-Aided Design and Manufacturing. CRC Press. 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	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 remember basic parts of I C Engines**(BL1-Remember)** **CO2-** To Understand Transmission and Braking system**(BL2-Understand)** **CO3-** To Apply the knowledge of Braking System & Electrical System. in automobile**(BL3-Apply)** **CO4-** To analyze the braking and suspension system in automobile. **(BL4-Analyze)** **CO5-** To evaluated and summarize the braking, suspension, power transmission and Automobile Air Conditioning..**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓		**SDG (Goals)**	SDG7(Affordable and clean energy) SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Power Unit: Design and Principles of major components, valve mechanism, power and torque characteristics, rolling, air and gradient resistance, tractive effort, gearbox, gear ratio determination, design of gear box.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-2	Transmission: Requirements, clutches, torque converters, overdrive and free wheel, universaljoint, differential gear mechanism of rear axle, automatic transmission, steering, and front axle, castor angle, wheel camber and toe-in, toe-out etc, steering geometry, Ackerman mechanism, under steer and over steer.	Lectures with whiteboard/PPT, Quiz, Group discussion Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-3	Braking System: General requirements, Road tyre adhesion, weight transfer, braking ratio, mechanical brakes, hydraulic Chassis and Suspension System: Loads on the frame, strength and stiffness,brakes, vacuum and air brakes, thermal aspects. Electrical System: Types of starting motors, generator and regulators, lighting system, ignition system, horn, battery.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-4	Introduction to Electric Vehicles: Electric Vehicle – Need – Types, Electric Vehicle Technology – layouts, Batteries – overview and its types. Charging – Methods and Standards. Alternate charging sources – Wireless & Solar, Hybrid Electric vehicles – Classification – Micro, Mild, Full, Plug-in, EV.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-5	Automobile Air Conditioning: Requirements, cooling and heating systems. Cooling and lubrication System: Different type of cooling system and lubrication system Fuel Supply System: Diesel & Petrol vehicle system such as fuel injection pump, injector and fuel pump, carburetor, MPFI	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	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 get the fundamentals of various types of CNC operations and production systems.**(BL1-Remember)** **CO2-** To understand the Basic concept of G codes, M codes for programming.**(BL2-Understand)** **CO3-** To implement G codes, M codes in programming.**(BL3-Apply)** **CO4-** To analyze the CNC program.**(BL4-Analyze)** **CO5-** To evaluate and summarize the CNC program.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✓ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit 1	Introduction to CNC Machine Tools: Development of CNC Technology-Principles and classification of CNC machines, Advantages & economic benefits, Types of control, CNC controllers, Characteristics, Interpolators, Applications, DNC concept.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit 2	CNC Programming: Co-ordinate System, Fundamentals of APT programming, Manual part programming-structure of part programme, G & M Codes, developing simple part programmes, Parametric programming, CAM packages for CNC machines-IDEAS, Unigraphics, Pro Engineer, CATIA, ESPIRIT, Mastercam etc., and use of standard controllers- FANUC, Heidenheimer and Sonometric control system.	Lectures with whiteboard/PPT, Quiz, Group discussion	10
Unit 3	Tooling for CNC Machines: Cutting tool materials, Carbide inserts classification; Qualified, semi- qualified and preset tooling, Cooling fed tooling system, Quick change tooling system, Tooling systemfor machining center and turning center, tool holders, Tool assemblies, Tool magazines, ATC mechanisms, Tool management.	Lectures with whiteboard/PPT, Quiz, Group discussion	9
Unit 4	Robotics and Material Handling Systems: Introduction to robotic technology, and applications, Robot anatomy, material handling function, Types of material handling equipment, Conveyer systems, Automated guided vehicle systems, Automated storage/retrieval systems, Work-in-process storage, Interfacing handling and storage with manufacturing.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit 5	Group Technology and Flexible Manufacturing System: group Technology-part families, Parts classification and coding, Production flow analysis, Machine Cell Design, Benefits of Group Technology, Flexible manufacturing systems-Introduction, FMS workstations, Computer control system, Planning for FMS, Applications and benefits.	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	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 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. 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 remember basics of physics.**(BL1-Remember)** **CO2-** To understand the tool materials and their proper applications.**(BL2-Understand)** **CO3-** To prepare and manufacture the various joints using carpentry and fitting shop tools and welding process.**(BL3-Apply)** **CO4-** To analyze casting and welding products.**(BL4-Analyze)** **CO5-** To evaluate the casting process parameters and welding parameters for efficient productivity.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✓ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)				

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	Carpentry Shop Carpentry, process of finished products, building work, furniture, cabinet making Etc. joinery, preparation of joints, Timber, Timber sizes, classification of Timber, Characteristics of good timber, seasoning of wood.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-2	Marking and Measuring Tools Steel rule and Steel tape, Marking gauge, Try-square, Compass and divider, Scriber or marking knife, Bevel, Holding Tools- Carpenter's vice, C-clamp , Bar cramp, Planning Tools- Jack plane, Smoothing plane, Rebate plane, Plough plane Cutting Tools- Saws, Cross-cut or hand saw, Rip saw, Tenon saw, Compass saw, Chisels, Drilling and boring tools- Carpenter's brace, Auger bit, Hand drill, Gimlet, miscellaneous tools- Mallet, Pincer, Claw hammer, Screw driver, Wood rasp file, Bradawl, wood joints- Lap joints, Mortise and Tenon Joints, Bridle joint.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-3	Welding Shop Electric arc welding, Gas welding, Thermal welding, Electrical Resistance welding, Friction welding Equipment Used for Welding- Transformers, Motor generators, Rectifiers, Welding cables, Electrodes, electrode holder, Ground clamp, wire brush and chipping hammer, Welding table and cabin, Face shield, Hand gloves. Techniques of welding Preparation of work, striking an arc, Strike and Withdraw, Touch and with draw, Weaving, Types of Joints- Butt Joint, Corner Joint, Tee Joint, Lap joint, Edge welding positions- Flat position welding, Horizontal position welding, Vertical position welding, Overhead position welding.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-4	Fitting Shop Introduction hand fitting,the assembly of machine tools, jigs, gauges, etc., bench work. assembly of mating parts, removal of metal, fit, simple hand tools. filing, chipping, scraping, sawing drilling, and tapping. Holding tools, Cutting Tools -Finishing Tools, Reamers, Files, miscellaneous tools ---- File card, Spirit level, Ball Peen Hammer, Cross Peen, Hammer, Straight-Peen Hammer, Screw driver, Spanners.	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	
Unit-5	Foundry shop Process, Melting, Furnace, Degassing, Mold making, Pouring, Shakeout, Degating, Heat treating, Surface cleaning, Finishing,	Lectures with whiteboard/PPT, Recorded video/interactive videos, Quiz	

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-