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SCHOOL OF ENGINEERING & TECHNOLOGY

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

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DEPARTMENT OF CIVIL ENGINEERING

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

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Department of Civil Engineering

Minutes of BOS Meeting

In order to review the scheme of B. Tech. Civil Engineering, B. Tech. Civil Engineering, a meeting of BOS was conducted on 22nd July 2023. This meeting is in continuation of BOS meeting previously held on 2nd February 2022.

The following members were present in the meeting:

Sr. No.	Name	Designation	Signature
1	Dr. Mukesh Kumar Pandey Professor Civil Engineering	Dean & Chairman	
2	Dr. Ranjeet Singh Tomar Professor EC Engineering	Invitee	
3	Dr. M. K. Trivedi Professor MITS Gwalior	Expert	
4	Mr. Aditya Sharma Assistant Professor Civil Engineering	Member	
5	Mrs. Anshu Tiwari Assistant Professor Civil Engineering	Member	
6	Mr. Nikhil Nandwani Assistant Professor Civil Engineering	Member	
7	Mr. Farhan ul Rahman Lecturer Civil Engineering	Member	
8	Dr. Manish Sharma Associate Professor Mathematics	Invitee	
9	Dr. Dinesh Singh Tomar Associate Professor and COE Mathematics	Invitee	
10	Dr. Keshav Kansana Associate Professor Management	Invitee	

Following decisions were taken after discussion:

1. Approval of minutes of the last BOS meeting held on 2nd Feb 2022.

2. The scheme of B. Tech. Civil Engineering I semester, III semester, V semester, VII semester for batch 2023-27 have been approved.

3. Based on suggestions given by the members, it is resolved to approve the syllabi with the following modification
   - In CEL 302 Topics related to Torsional stresses are added in Unit V.
   - In CEL0303 Repair and Rehabilitation of structures is introduced.
   - In CEL0313 Tie bars in Unit III and Evaluation and maintenance of pavements in Unit IV are introduced.
   - In CEL0331 Design Problems of Soft Storey is introduced in Unit IV.
   - In CEL 333 topics related to recent trends were added in all Units..
   - In CEL510 Venturi Flume is introduced for Unit IV
   - In CEL511 Duties of Marine Surveyor is added in Unit II
   - In CEL512, Components of Staircase is introduced in Unit V.
   - In CEL515, Analysis of Retaining Walls is introduced in Unit I.
   - In CEL725, Grouting and Waiting Line Models were added in Unit II and Unit V.

ANNEXURE I

Course Code	Course Name	Semester	Number of topics (if subject is new)	Change in the number of topics	Change Percentage	Remarks
CEL0101[T]	Introduction to Structural Engineering	I	60	0	0	
CEL0302[T]	Strength of Materials	III	58	12	20.69	
CEL0303[T]	Concrete Technology	III	75	10	13.33	
CEL0313[T]	Highway and Traffic Engineering	III	62	7	11.29	
CEL0331[T]	Elementary design of structures (RCC)	III	34	2	5.88	
CEL0333[T]	Building Planning and Drawing	III	41	20	48.78	
CEL0510[T]	Hydraulics & fluid machine	V	80	4	5	
CEL0511[T]	Advanced Surveying	V	52	1	1.92	
CEL0512[T]	Fundamentals of Structural design(RCC)	V	37	4	10.81	
CEL0514[T]	Advanced Methods of Structural Analysis	V	50	0	0	
CEL0515[T]	Advanced Geotech Engineering	V	69	8	11.59	
CEL0723[T]	Advanced Structural Design(Steel)	VII	42	0	0	
CEL0731[T]	Railway Engineering	VII	46	0	0	
CEL0725[T]	Introduction to Construction Planning and Management	VII	51	5	9.80	
CEE0701[T]	MATRIX ANALYSIS OF STRUCTURES	VII	42	0	0	
CEE0702[T]	Advanced Foundation Engineering	VII	51	0	0	
CEE0703[T]	Pavement Design	VII	43	0	0	
CEE0704[T]	Seismic analysis of structures	VII	50	0	0	
CEE0705[T]	Fundamentals of Remote Sensing & GIS	VII	45	0	0	
CEE0706[T]	Fluid Dynamics	VII	46	0	0	
CEE0707[T]	Wastewater Treatment and Recycling	VII	44	0	0	
CEE0708[T]	Sustainable Construction Methods	VII	48	0	0	
Total Percentage Change					**6.32%**	

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Department of Civil Engineering

Minutes of BOS Meeting

In order to review the scheme of B. Tech. Civil Engineering, a meeting of BOS was conducted on 27th January 2024. This meeting is in continuation of BOS meeting previously held on 22nd July 2023.

The following members were present in the meeting:

Sr. No.	Name	Designation	Signature
1	Dr. Mukesh Kumar Pandey Professor Civil Engineering	Dean & Chairman	
2	Dr. Ranjeet Singh Tomar Professor EC Engineering	Invitee	
3	Dr. M. K. Trivedi Professor MITS Gwalior	Expert	
4	Mr. Aditya Sharma Assistant Professor Civil Engineering	Member	
5	Mr. Shashank Gupta Assistant Professor Civil Engineering	Member	
6	Mrs. Anshu Tiwari Assistant Professor Civil Engineering	Member	
7	Mr. Farhan ul Rahman Lecturer Civil Engineering	Member	
8	Dr. Dinesh Singh Tomar Associate Professor and COE Mathematics	Invitee	
9	Dr. Keshav Kansana Associate Professor Management	Invitee	

Following decisions were taken after discussion:

1. Approval of minutes of the last BOS meeting held on 22nd July 2023.

2. The scheme of B. Tech. Civil Engineering II semester, IV semester, VI semester, VIII semester for batch of 2023-27 have been approved.

3. Program Electives are increased from 3 to 4 in VI Sem. The Syllabus is Attached (See Annexure 2)

4. Based on suggestions given by the members, it is resolved to approve the syllabi with the following modification
   - In CEL 233 Stone Slating in Unit II and Prefabrication is added in V Unit.
   - In CEL0407 Contouring, Trigonometric Leveling and Introduction to DGPS in all Units are introduced.
   - In CEL408 Topics Related to Lateral Earth Pressure have been removed
   - In CEL0409 Analysis of Cables is introduced in Unit III.
   - In CEL432, Design for Parallel and Perpendicular Loading for bolted connection in Unit II and Design for Parallel and Perpendicular Loading for welded connection in Unit III are introduced.
   - In CEL619 All types of Loading on Bridges in Unit V is introduced
   - In CEL621 several topics related to quantities, drainage specifications, services in buildings are added in all units
   - In CEL 634 Methods of Biological Treatment are added in Unit V

ANNEXURE I

Course Code	Course Name	Semester	Number of topics (if subject is new)	Change in the number of topics	Change Percentage	Remarks
CEL0233[T]	Structural Materials	II	60	12	20	
CEL0406[T]	Fluid Mechanics	IV	54	0	0	
CEL0407[T]	Fundamentals of Surveying	IV	77	7	9.09	
CEL0408[T]	Fundamentals of Geotechnical Engineering	IV	62	12	19.36	
CEL0409[T]	Basic Methods of Structural Analysis	IV	61	5	8.20	
CEL0432[T]	Elementary Design of Structures (Steel)	V	50	0	0	
CEL0617[T]	Basic of Structural Design (Steel)	VI	36	0	0	
CEL0619[T]	Advanced Structural Design (RCC)	VI	39	2	5.13	
CEL0621[T]	Quantity Surveying & Costing	VI	45	5	11.11	
CEL0634[T]	Environmental Engineering	VI	77	8	10.39	
CEE0601[T]	Water Resource & Irrigation Engineering	VI	42	0	0	
CEE0602[T]	Geo-synthetics and Reinforced Soil Structures	VI	42	0	0	
CEE0603[T]	Introduction to Finite Element Analysis	VI	44	0	0	
CEE0604[T]	Smart Cities	VI	46	46	100	Newly Added
CEL0831[T]	Retrofitting and rehabilitation of structures	VIII	63	0	0	
CEL0827[T]	Design of Hydraulic Structures	VIII	69	0	0	
CEE0807[T]	Plastic design of steel structure	VIII	48	0	0	
CEE0808[T]	Building Environment & Services	VIII	45	0	0	
CEE0809[T]	Design of Pre stressed Concrete Structure	VIII	45	0	0	
CEE0810[T]	Traffic Engineering	VIII	48	0	0	
CEE0811[T]	Energy Efficient and Green Building	VIII	47	0	0	
CEE0812[T]	Airport Engineering	VIII	46	0	0	
CEE0813[T]	Solid Waste Management	VIII	52	0	0	
CEE0814[T]	Urban Transportation Planning	VIII	42	0	0	
Total Percentage Change					**5%**	

Syllabus-2023-2024

(SOET)(BTech-CivilEngineering)

Title of the Course	Smart Cities
Course Code	CEE0604[T]

Part A

Year		**Semester**		**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_.pd
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	PS
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

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Department of Electronics & Communication Engineering
ITM University, Gwalior
Session 2023-2024

NOTICE

Date: July 14, 2023

Members of Board of Studies are being informed regarding the BOS meeting scheduled with the following agenda:

a. Approval of scheme of Examination B. Tech. (I Semester to VIII Semester) for the batch 2023.
b. Approval of syllabi of B. Tech. (I Semester and VIII Semester) for the batch 2023.
c. Review of syllabi of B. Tech. ECE for the batches 2022, 2021, 2020.
d. Approval of new courses as mandatory, MOOC, Elective courses.
e. Approval of addition/deletion of some courses based on industry demand.
f. Approval of revisions proposed in the existing courses and credits revision.

List of members:

Sr. No.	Name	Designation
1.	Prof. (Dr.) Ranjeet Singh Tomar	HOD & Chairman BOS
2.	Prof. (Dr.) Aditya Trivedi	Prof. & Head, External Expert ABV-IIITM Gwalior
3.	Dr. Mukesh Pandey	Professor, Dean SOET
4.	Dr. Shyam Akashe	Professor, Member
5.	Dr. Sadhana Mishra	Assistant Professor, Member
6.	Mr. Mayank Sharma	Assistant Professor, Member
7.	Mr. Bhupendra Dhakad	Assistant Professor, Member
8.	Mr. Shailendra Singh Ojha	Assistant Professor, Member

The meeting will be held on July 22, 2023 from 2:00PM onwards at conference room of MG block.

Cc: VC Office
Registrar Office
Dean Academic Office

Prof.(DR.) Ranjeet Singh Tomar
Head of Department
Electronics & Communication Engg.
ITM University
Gwalior (M.P.)
HoD ECE

Department of Electronics & Communication Engineering, School of Engineering & Technology (SOET)
ITM University, Gwalior
Session 2023-2024

Minutes of the Board of Studies Meeting

Date: July 22, 2023
Venue: Conference Room, MG Block, Ground Floor

Agenda:

1. Approval of the Scheme of Examination for B. Tech. (I Semester to VIII Semester) for the batch 2023.
2. Approval of the Syllabi for B. Tech. (I Semester to VIII Semester) for the batch 2023.
3. Review of Syllabi for B. Tech. Electronics & Communication Engineering for the batches 2022, 2021, 2020.
4. Approval of new courses as Mandatory and Elective courses.
5. Approval of MOOC courses & value added courses.
6. Approval of revisions proposed in the existing courses.

Attendance:

Sr. No.	Name	Designation
1.	Prof. Ranjeet Singh Tomar	HOD & Chairman BOS
2.	Prof. Aditya Trivedi	Prof. & Head, External Expert, ABV-IIITM Gwalior
3.	Prof. Mukesh Pandey	Professor & Dean, SOET
4.	Prof. Shyam Akashe	Professor & Dean IC, Member
5.	Dr. Sadhana Mishra	Assistant Professor, Member
6.	Mr. Mayank Sharma	Assistant Professor, Member
7.	Mr. Bhupendra Dhakad	Assistant Professor, Member
8.	Mr. Shailendra Singh Ojha	Assistant Professor, Member

Decisions Taken:

1. **Approval of Examination Schemes:**
   - Approved the examination schemes for B. Tech. Electronics & Communication Engineering (I Semester to VIII Semester) for the batch 2023.
2. **Approval of Syllabi:**

- Approved the syllabi for B. Tech. Electronics & Communication Engineering I to VIII Semester for the batch 2023.

3. **Review and Approval of Syllabi:**
   - Reviewed and approved the syllabi of following:
     - B. Tech. Electronics & Communication Engineering batch 2022, III and IV Semester.
     - B. Tech. Electronics & Communication Engineering batch 2021, V and VI Semester.
     - B. Tech. Electronics & Communication Engineering batch 2020, VII and VIII Semester.
4. **Approval of Revisions:**
   - Approved revisions for:
     - Network Analysis & Synthesis ECL0307, with a credit change to 40% for III Semester.
     - Architecture of Smart IoT Devices ECL0304, with a credit change to 50% for III Semester.
5. **Recommendation:**
   - The Board of Studies recommended the discussed points for further approval by the Academic Council of the University.

Note: Annexure 1 is containing the details of revisions carried out in the syllabus.

Prof.(DR.) Ranjeet Singh Tomar
Head of Department
Electronics & Communication Engg.
ITM University
Gwalior (M.P.)
HOD & Chairman BOS

Department of Electronics & Communication Engineering, School of Engineering & Technology (SOET)
ITM University, Gwalior
Session 2023-2024

Board of Studies (BOS) Meeting Attendance

Date: July 22, 2023
Venue: Conference Room, MG Block, Ground Floor

Attendance List:

Sr. No.	Name	Designation	Signature
1.	Prof. Ranjeet Singh Tomar	HOD & Chairman BOS	
2.	Prof. Aditya Trivedi	Prof. & Head, External Expert, ABV-IIITM Gwalior	
3.	Prof. Mukesh Pandey	Professor & Dean, SOET	
4.	Prof. Shyam Akashe	Professor & Dean IC, Member	
5.	Dr. Sadhana Mishra	Assistant Professor, Member	
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8.	Mr. Shailendra Singh Ojha	Assistant Professor, Member	

Prof. Ranjeet Singh Tomar
HOD & Chairman BOS

Head of Department
Electronics & Communication Engg.
ITM University
Gwalior (M.P.)

Annexure 1: Details of revisions carried out in the courses

ECE syllabus revision for the year 2023-24

Scheme 2022-23 and 2023-24

ITM UNIVERSITY

STUDY AND EVALUATION SCHEME (2022-2023)
(SUBJECT-WISE DISTRIBUTION OF MARKS AND CORRESPONDING CREDITS)

Programme:BTech(Electronics_and_Communication) Semester:3rd

S.No.	Course Code	Course Name	Maximum Marks Allotted							Credits Allotted			Total Credits
			Theory			Practical			Total Marks				
			End Sem. Exam	Mid Sem. Exam	Class Participation	End Sem. Exam	Progressive Evaluation	Internal Viva		L	T	P	
1	ECL0303[T]	Semiconductor Devices	40	30	30	0	0	0	100	2	1	0	3
2	ECL0304[T]	Architecturing of Smart IoT Devices	40	30	30	0	0	0	100	3	0	0	3
3	ECL0306[T]	Digital Electronics	40	30	30	0	0	0	100	2	1	0	3
4	ECL0307[T]	Network Analysis & Synthesis	40	30	30	0	0	0	100	2	1	0	3
5	MAL0306[T]	Engineering Mathematics	40	30	30	0	0	0	100	3	1	0	4
6	CSP0303[P]	Object Oriented Programming with Java	0	0	0	40	30	30	100	0	0	2	2
7	ECD0301[P]	Evaluation of Industrial Training-I	0	0	0	40	30	30	100	0	0	2	2
8	ECL0303[P]	Semiconductor Devices	0	0	0	40	30	30	100	0	0	1	1
9	ECL0304[P]	Architecturing of Smart IoT Devices	0	0	0	40	30	30	100	0	0	1	1
10	ECL0306[P]	Digital Electronics	0	0	0	40	30	30	100	0	0	1	1
11	ECL0307[P]	Network Analysis & Synthesis	0	0	0	40	30	30	100	0	0	1	1
												Total Credits	24

*Newly Added Courses

ITM UNIVERSITY

STUDY AND EVALUATION SCHEME (2023-2024)
(SUBJECT-WISE DISTRIBUTION OF MARKS AND CORRESPONDING CREDITS)

Programme:BTech(Electronics_and_Communication) Semester:3rd

S.No.	Course Code	Course Name	Maximum Marks Allotted							Credits Allotted			Total Credits
			Theory			Practical			Total Marks				
			End Sem. Exam	Mid Sem. Exam	Class Participation	End Sem. Exam	Progressive Evaluation	Internal Viva		L	T	P	
1	ECL0303[T]	Semiconductor Devices	60	20	20	0	0	0	100	2	1	0	3
2	ECL0304[T]	Architecturing of Smart IoT Devices	60	20	20	0	0	0	100	3	0	0	3
3	ECL0306[T]	Digital Electronics	60	20	20	0	0	0	100	2	1	0	3
4	ECL0307[T]	Network Analysis & Synthesis	60	20	20	0	0	0	100	2	1	0	3
5	MAL0306[T]	Engineering Mathematics	60	20	20	0	0	0	100	3	1	0	4
6	CSN0303[P]	Object Oriented Programming with Java	0	0	0	60	20	20	100	0	0	2	2
7	ECD0301[P]	Evaluation of Industrial Training-I	0	0	0	60	20	20	100	0	0	2	2
8	ECL0303[P]	Semiconductor Devices	0	0	0	60	20	20	100	0	0	1	1
9	ECL0304[P]	Architecturing of Smart IoT Devices	0	0	0	60	20	20	100	0	0	1	1
10	ECL0306[P]	Digital Electronics	0	0	0	60	20	20	100	0	0	1	1
11	ECL0307[P]	Network Analysis & Synthesis	0	0	0	60	20	20	100	0	0	1	1
												Total Credits	24

*Newly Added Courses

Syllabus previous and current year

Previous Syllabus: 2022-23

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

Revised Syllabus 2023-24

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Syllabus-2023-2024

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Network Analysis & Synthesis
Course Code	ECL0307[T]

Part A

					L	T	P	C
Year	2nd	**Semester**	3rd	**Credits**	2	1	1	4
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	Concepts of DC circuits, AC circuits, Laplace transform and Differential equation.			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the concepts of basic electric circuits.**(BL1-Remember)** **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)**							
Course 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**: Electrical elements description (resistor, capacitor, inductor), Electrical circuit & network, Linear & nonlinear elements, Unilateral and bilateral elements, Active and passive elements, Sources (dependent and independent voltage and current source), Kirchhoff's Laws (KVL and KCL), Network solution methods (Mesh analysis, Node analysis and Branch current analysis), series and parallel connection of resistors, inductors and capacitors, Source transforms theorem.	Lecture Method/ Case Study/ Video/ Group Discussion	12
2	**Networks Theorems for AC and DC circuits:** Thevenin's, Norton's, Superposition, Reciprocity, Maximum power transfer and millmn's theorems problems with dependent and independent sources. Star to delta and delta to star conversion.	Lecture Method/ Case Study/ Video/ Group Discussion	10
3	**Two Port Parameters**: short circuit admittance parameters, the open circuit impedance parameters, Transmission parameters, hybrid parameters, relation between parameters sets, parallel connection and cascade connection of two port network, reciprocity and symmetry in all parameters.	Lecture Method/ Video/ Group Discussion	10
4	**The Laplace Transform & its Application on Network Circuits** – RL, LC, CR, RLC & Initial condition (series & parallel combinations), initial and final value theorem. **Transient analysis:** Transients in RL, RC and RLC circuits, initial conditions, time constants, networks driven by constant driving sources and their solutions, Steady state analysis of RL, RC and RLC circuits, Laplace transform solution of Integral-differential equations	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

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mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To verify Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL).	Experiments	BL5-Evaluate	2
5	Determination of the Z- Parameters of a Two-Port Network.tion of network theorems	Experiments	BL5-Evaluate	2
3	Determination of the Y -Parameters of a Two-Port Network.	Experiments	BL5-Evaluate	2
4	Determination of the A, B, C, D Parameters of a Two-Port Network.	Experiments	BL5-Evaluate	2
4	Determination of the h- Parameters of a Two-Port Network.	Experiments	BL5-Evaluate	2
2	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=GRoHvR8obfM

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	
Practical					
Total Marks	Minimum Passing Marks	External Evaluation	Min. External Evaluation	Internal Evaluation	Min. Internal Evaluation

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CELEBRATING DREAMS

Previous Syllabus: 2022-23

Syllabus-2022-2023

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Architecturing of Smart IoT Devices
Course Code	ECL0304[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	To understand the contents and successfully complete this course, a participant must have a basic understanding of Sensors, Actuators, Interfacing of devices, Arduino IDE software and Hardware			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic definitions, key terminologies of Architecture of IoT, IoT architecture standards, Communication Technologies, Networking Technologies, IoT Protocols. **(BL1-Remember)** **CO2-** To understand the working principles, concepts, & circuit designs of various communication & Networking Technologies for IoT.**(BL2-Understand)** **CO3-** To apply that how to these technologies work with and interpret the data obtained from various IoT applications.**(BL3-Apply)** **CO4-** To analyse various IoT architecture reference models using simulation or performing experiments on IoT builder kit.**(BL4-Analyze)** **CO5-** Evaluate performance of IoT systems for various applications.**(BL5-Evaluate)**							
Course 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	IoT Architecture Reference Model (ARM): IoT an Overview, Evolution of IoT, Need for ARM, IoT conceptual framework, IoT Architectural view: reference model definition, IoT reference model by CISCO, Oracle's IoT structure, Major components of IoT devices: Physical objects, Hardware, Communication Module, Software, IoT software components for device hardware. Development tools and Open-source Framework for IoT Implementation, Platforms and Integration tools	Lecture Method/Video	12
II	Programming Raspberry Pi: Introduction to Raspberry Pi, Basic Architecture, Pin Configuration, Installation, Interfacing of Sensors, Interfacing of Actuators & Display Devices with Raspberry Pi & Programming concepts.	Lecture Method/Simulation	12
III	IoT Architecture standards: ETSI standard for IoT Architecture: Standards for IoT for Home, Energy, People, motion, City. IoT Communication Architecture: IoT nodes, IoT Edge, 6LOWPAN, IPv4/IPv6, MQTT, SMQTT, CoAP, XMPP, AMQP protocols	Lecture Method	10
IV	M2M Communication M2M Communication, M2M system Architecture: M2M device domain, M2M Network Domain, M2M application Domain, M2M applications, M2M software and development tools, Difference between M2M and IoT.	Lecture Method/Research	10
V	IoT Case studies Cloud computing, cloud computing services, how to send data on cloud platforms like thing speak, Blynk etc. IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation.	Lecture Method/Case Study	10

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CELEBRATING DREAMS

Revised Syllabus: 2023-24

Syllabus-2023-2024

(SOET)(BTech-Electronics_and_Communication)

Title of the Course	Architecturing of Smart IoT Devices
Course Code	ECL0304[T]

Part A

Year	2nd	**Semester**	3rd	**Credits**	L	T	P	C
					3	1	1	5
Course Type	Embedded theory and lab							
Course Category	Disciplinary Major							
Pre-Requisite/s	To understand the contents and successfully complete this course, a participant must have a basic understanding of Sensors, Actuators, Interfacing of devices, Arduino IDE software and Hardware			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To remember the basic definitions, key terminologies of Architecture of IoT, IoT architecture standards, Networking Technologies, IoT Protocols. **(BL1-Remember)** **CO2-** To understand the basic concepts. & programming environment of various IoT Platforms. **(BL2-Understand)** **CO3-** To apply that how to these technologies work with and interpret the data obtained from various IoT applications.**(BL3-Apply)** **CO4-** To analyse various IoT architecture reference models using simulation or performing experiments on IoT builder kit.**(BL4-Analyze)** **CO5-** Evaluate performance of IoT systems for various applications.**(BL5-Evaluate)**							
Course 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	IoT Architecture Reference Model (ARM): IoT an Overview, Evolution of IoT, Need for ARM, IoT conceptual framework, IoT Architectural view: reference model definition, IoT reference model by CISCO, Oracle's IoT structure, Major components of IoT devices: Physical objects, Hardware, Communication Module, Software, IoT software components for device hardware. Development tools and Open-source Framework for IoT Implementation, Platforms and Integration tools	Lecture Method/Video	12
II	Python Introduction and Setting up the Environment, Basics of Python Tools, Sequence data types and associated operations: Strings, Lists, Arrays,Tuples, Dictionary, Sets, Range. NumPy: ndArray Pandas dataframe and dataframe related operations on Toyota Corolla dataset: Reading files, Exploratory data analysis, Data preparation and preprocessing	Lecture Method/Simulation	12
III	Data visualization on Toyoto Corolla dataset using matplotlib and seaborn libraries: Scatter plot, Line plot, Bar plot, Histogram, Box plot, Pair plot. Control structures using Toyota Corolla dataset: if-else family, for loop, for loop with if break, while loop. Functions, how to send data on cloud platforms like Thing speak, Blynk Platforms using NODEMCU device.	Lecture Method	10
IV	Programming Raspberry Pi: Introduction to Raspberry Pi, Basic Architecture, Pin Configuration, Installation, Interfacing of Sensors, Interfacing of Actuators & Display Devices with Raspberry Pi & Programming concepts.	Lecture Method/Research	10
V	IoT Architecture standards: ETSI standard for IoT Architecture: Standards for IoT for Home, Energy, People, motion, City. IoT Communication Architecture: IoT nodes, IoT Edge, 6LOWPAN, IPv4/IPv6, MQTT, SMQTT, CoAP, XMPP, AMQP protocols	Lecture Method/Case Study	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
1	To study IoT Builder kit & its sub system.	Experiments	BL2-Understand	2
1	To implement a GUI python program to control LED.	Experiments	BL4-Analyze	2
3	To implement a python program to interface DC Motor with IoT Development Kit.	Experiments	BL5-Evaluate	2
2	To write and implemetnt python program to control Stepper motor.	Experiments	BL3-Apply	2
3	To send & Visualize data on Thing speak cloud Platform using NODE MCU. for Dirrerent Applications such as Pulse Rate Monitoring	PBL	BL5-Evaluate	10
3	Smart Home Automation with NODEMCU Platform.	PBL	BL6-Create	10
5	Smart Healthcare Projects, Smart environment Projects, Agriculture sensors interfacing projects	PBL	BL6-Create	20

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DEPARTMENT OF MECHANICAL ENGINEERING

ITM UNIVERSITY

20 July 2023

Department of Mechanical Engineering
Minutes of BoS Meeting

In order to review the schemes of B.Tech. Mechanical Engineering (Specialization in Manufacturing Technology) and B.Tech. Mechanical Engineering (Specialization in AI and Robotics), a meeting of Board of Studies (BoS) was conducted on 20th of July 2023.

The following members were present in the meeting:

Sr. No.	Name	Designation		Signature
1	Dr. Mukesh Kumar Pandey	Professor and Head-CE	Dean-SoET	
2	Dr. Rajendra Singh Rajput	HoD-ME	Chairman	
3	Dr. C. S. Malvi	Professor-ME, MITS Gwalior	Subject Expert	
4	Mr. Arun Kushwah	Asst. Professor-ME	Member	
5	Dr. Shashikant Pandey	Asst. Professor-ME	Member	
6	Mr. Sateesh Kumar	Asst. Professor-ME	Member	
7	Mr. Jai Kumar	Asst. Professor-ME	Member	
8	Mr. Nishant Kumar	Asst. Professor-ME	Member	
9	Dr. Ranjeet Singh Tomar	Dean- Academics	Invitee	
10	Dr. Manish Sharma	HOD-Mathematics	Invitee	
11	Dr. Shashikant Gupta	HOD-CSE	Invitee	
12	Dr. Shivom Singh	Associate Professor and Coordinator-Environmental Science	Invitee	

Following decisions were taken after discussion:

1. Approval / review of minutes of last BoS held on 03 Feb 2022 was done.
2. Following schemes were reviewed and approved-

- The schemes of B.Tech. Mechanical Engineering (Specialization in Manufacturing Technology) from VII to VIII semester for batch of 2020-24 have been approved.
- The schemes of B.Tech. Mechanical Engineering (Specialization in Manufacturing

Technology) from V to VIII semester for batch of 2021-25 have been approved.

- The schemes of B.Tech. Mechanical Engineering (Specialization in Manufacturing Technology) from III to VIII semester for batch of 2022-26 have been approved with revision in syllabus of III, V and VII semester subjects. (details in annexure I)
- The schemes of B.Tech. Mechanical Engineering (Specialization in AI and Robotics) from I to II semester for batch of 2023-27 have been approved with the revision in I semester subjects.

3. Following modifications have been suggested by the subject expert for Batch 2023-27-
    - MEL0415- Kinematics of Machines and MEL0518- Dynamics of Machines are to be merged as Theory of machines
    - MEL0620 Power plant and MEL0411 Energy conversion systems are to be merged.
    - New subjects – Artificial intelligence and Machine learning, IOT and Industrial robotics and others may be introduced for batch 2023-27.
    - Electives from 6 sem may be incorporated.
    - The above suggestions may be introduced in the next Board of Studies (BoS), Dec 2023.

The Board of Studies recommended above discussed points further for approval by the Academic Council of the University.

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Annexure-I

- **Syllabus revisions were carried out in the following subjects of batch 2022-26**
  1. MEL0305- Basic Thermodynamics has change of 5%.
  2. MEL0308- Measurement and Metrology has change of 10%.
  3. MEL0341- Manufacturing Technology-II has 10 % change.
  4. MEL0515- Machine Design-I has revision of 5%.
  5. MEL0516- I C Engine has change of 10%.
- **Syllabus revisions were carried out in the following subjects of batch 2023-27**
  1. MEL0104- Material Science has 5% change.
  2. MEL0101- Engineering Mechanics has change of 10 %.

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13 Jan 2024

Department of Mechanical Engineering
Minutes of BoS Meeting

In order to review the schemes of B.Tech. Mechanical Engineering (Specialization in Manufacturing Technology) and B.Tech. Mechanical Engineering (Specialization in AI and Robotics), a meeting of Board of Studies (BoS) was conducted on 13th of Jan 2024.

The following members were present in the meeting:

Sr. No.	Name	Designation		Signature
1	Dr. Mukesh Kumar Pandey	Professor and Head-ME	Dean-SoET and Chairman	
2	Dr. C. S. Malvi	Professor-ME, MITS Gwalior	Subject Expert	
3	Dr. Rajendra Singh Rajput	Associate Professor	Member	
4	Mr. Arun Kushwah	Asst. Professor-ME	Member	
5	Dr. Shashikant Pandey	Asst. Professor-ME	Member	
6	Mr. Sateesh Kumar	Asst. Professor-ME	Member	
7	Mr. Jai Kumar	Asst. Professor-ME	Member	
8	Mr. Prabhu Dayal	Asst. Professor-ME	Member	
9	Mr. Vinod Rathore	Asst. Professor-ME	Member	
10	Dr. Ranjeet Singh Tomar	Dean- Academics	Invitee	
11	Dr. Dinesh Tomar	Asst. Professor-Mathematics	Invitee	
12	Dr. Shashikant Gupta	HOD-CSE	Invitee	

Following decisions were taken after discussion:

1. Approval / review of minutes of last BoS held on 20 July 2023 was done.

Dr. Mukesh Kumar Pandey
Dr. C. S. Malvi
Dr. Rajendra Singh Rajput
Mr. Arun Kushwah
Dr. Shashikant Pandey
Mr. Sateesh Kumar
Mr. Jai Kumar
Mr. Prabhu Dayal
Mr. Vinod Rathore
Dr. Ranjeet Singh Tomar
Dr. Dinesh Tomar
Dr. Shashikant Gupta

2. Following schemes were reviewed and approved-

   - The scheme of B.Tech. Mechanical Engineering (Specialization in Manufacturing Technology) of VI semester for batch of 2021-25 has been approved. The subject MEL0620- Power Plant engineering has been replaced by MEL0621- Robotic Process Automation. The important part of power plant has been merged with MEL0411- Energy conversion systems as per the suggestion of last BoS, July 2023 held.
   - The schemes of B.Tech. Mechanical Engineering (Specialization in Manufacturing Technology) from IV to VIII semester for batch of 2022-26 have been approved with revision in syllabus of IV, VI and VIII semester subjects. (details in annexure I)

3. The schemes of B.Tech. Mechanical Engineering (Specialization in AI and Robotics) from I to IV semester for batch of 2023-27 have been approved.

4. Following modifications have been incorporated as suggested by the subject expert -

   - The MEL0620- Power Plant Engineering has been merged with MEL0411- Energy Conversion Systems in the scheme of batch 2022-26 onwards.
   - A new subject MEL0621-Robotic Process Automation has been introduced in the batch of 2021-25 in place of MEL0620- Power Plant Engineering and as an elective subject in the scheme VI sem of batch 2022-26 onwards.
   - The MEL0415-Kinematics of Machines and MEL0518- Dynamics of machines have been merged as new subject MEL0416-Theory of Machines in the IV sem scheme of batch 2023-27.
   - Also elective subjects MEE0622- Electric Vehicle Engineering and MEE0623- Tribology Engineering have been introduced in the VI sem scheme of batch 2022-26.

The Board of Studies recommended above discussed points further for approval by the Academic Council of the University.

Dr. Mukesh Kumar Pandey | Dr. C. S. Malvi | Dr. Rajendra Singh Rajput | Mr. Arun Kushwah | Dr. Shashikant Pandey

Mr. Satyesh Kumar | Mr. [illegible] Kumar | Mr. Pradhu Dayal | Mr. Vinod Rathore | Dr. Ranjeet Singh Tomar

Dr. Dinesh Tomar | Dr. Shashikant Gupta

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Annexure-I

- **Syllabus revisions were carried out in the following subjects of batch 2022-26**
  1. MEL0411- Energy Conversion Systems has change of 40%.
  2. MEL0422- Machining Processes has change of 10%.
  3. MEL0409- Industrial Engineering has change of 20 %.
  4. MEL0407- Fluid Mechanics has revision of 10%.
  5. MEL0617- Machine Design-II has change of 5%.
  6. MEL0619- Heat & Mass Transfer has change of 10%.
  7. MEL0825- Automobile Engineering has change of 25%

- **New Subjects Introduced-**
  1. MEL0621- Robotic Process Automation in the VI sem scheme of Batch 2021-25 and as MEE0621- Robotic Process Automation elective in the scheme of batch 2022-26.
  2. MEL0416- Theory of Machines in the scheme of Batch of 2023-27.
  3. MEE0622- Electric Vehicle Engineering and MEE0623- Tribology Engineering have been introduced as electives in the VI sem scheme of batch 2022-26.

S. No.	Subject Code	Name of Subject	% Change of syllabus revision
1	MEL0407	Fluid mechanics	10%
2	MEL0411	Energy Conversion Systems	40%
3	MEL0415	Kinematics of Machines	0%
4	MEL0442	Machining processes	10%
5	MEL0409	Industrial Engineering	20%
6	CSP0401	Object Oriented Programming Methodology (Python)	0%
7	MEL0617	Machine Design-II	5%
8	[illegible]	[illegible]	10%
9	MEL0621	Robotic Process Automation	100%
10	[illegible]	Operations Research	0%
11	MEL 0627	Additive Manufacturing	0%
12	MEL0825	Automobile Engineering	25%
13	MEL0827	CNC & Flexible Manufacturing Systems	0%
14	MEE0809	Vibration and Noise- Measurement and Control	0%
15	MEE0813	Computer Integrated Manufacturing	0%
16	MEL0416	Theory of Machines	100%
17	MEE0622	Electric Vehicle Engineering	100%
18	MEE0623	Tribology Engineering	100%
		Overall revision in syllabus	28.89 %

Dr. Mukesh Kumar Pandey
Dr. C. S. Malvi
Dr. Rajendra Singh Rajput
Mr. Arun Kushwah
Dr. Shashikant Pandey
Mr. Sandeep Kumar
Mr. Jai Kumar
Mr. Prabhu Dayal
Mr. Vinod Rathore
Dr. Ranjeet Singh Tomar
Dr. Dinesh Tomar
Dr. Shashikant Gupta

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Syllabus-2023-2024

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Robotic Process Automation
Course Code	MEE0621

Part A

Year		**Semester**		**Credits**	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Knowledge of mechanical systems and computer science engineering			**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** To understand basic concept of Robotic process Automation**(BL1-Remember)** **CO2-** To introduce different platforms for RPA**(BL2-Understand)** **CO3-** To identify and apply Image, Text and Data Tables Automation**(BL3-Apply)** **CO4-** To analyze- how to handle the User Events and various types of Exceptions and strategies**(BL4-Analyze)** **CO5-** To evaluate the deployment of the Robotic automation.**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✕		**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)				

Arun S. Kushwah. SATEESH KUMAR Shashikant Pandey Jai Kumar (Dr. R.S. Rajpoot)

(Dr. C.S. Malvi)

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Introduction to Robotic Process Automation: Metal Cutting: Scope and techniques of automation, Benefits of RPA, Components of RPA, RPA platforms, The future of automation. RPA BASICS: History of Automation, RPA vs Automation, Processes& Flowcharts, Programming Constructs in RPA, What Processes can be Automated, Types of Bots, Workloads, RPA Advanced Concepts, Standardization of processes, RPA Development methodologies, Robotic control flow, Risks & Challenges with RPA - RPA and emerging ecosystem.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-II	Overview of Robotic Process Automation Tools: Introduction to Robotic Process Automation Tools, Basic components in a RPA platform, Installation details of RPA tools, Types of Templates, User Interface, Domains in Activities, Workflow Files in the RPA platform	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-III	Process Components and Activities: Process Components and Activities: User Interface Automation Activities, System Activities, Variables, Arguments, Imports Panel and User Events	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-IV	App Integration, Recording and Scraping: App Integration, Recording, Scraping, Selector, Workflow Activities. Example of Automate login to your (web)Email account, recording mouse and keyboard actions to perform an operation, scraping data from website and writing to CSV.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-V	Data Manipulation and PDF Automation: Data Manipulation, Automation of Virtual Machines, Introduction to Native Citrix Automation, Text and Image Automation, PDF Automation Workflow Management Automation: RPA Orchestrator Overview, Orchestrator activities	Lectures with whiteboard/PPT, Quiz, Group discussion	8

Arun S. Kushwah SATEESH KUMAR Shashikant Pandey Jai Kumar Dr. R.S. Rajpu

(Dr. C.S. Malvi)

Part D(Marks Distribution)

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

Part E

Books	UiPath by Alok Mani Tripathi Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool Packt Publishing, Mumbai, 2018.
Articles	
References Books	Tom Taulli The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems Apress publications, 2020.
MOOC Courses	https://www.coursera.org/courses?query=robotic%20process%20automation
Videos	

Course Articulation Matrix

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

Arun S. Kushwah

SATEESH KUMAR

Shashikant Pandey

Jai Kumar

DR. R. S. Rajpal

DR. C. S. Malvi

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Syllabus-2023-2024

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Electric Vehicle Engineering
Course Code	MEE0622

Part A

Year		**Semester**		**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)				

Arun S. Kushwah

SATEESH KUMAR

Shashikant Pandey

Jai Kumar

Dr. R. S. Rajput

Dr. C. S. Malvi

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**

Arun S. Kushwah SATEESH KUMAR Shashikant Pandey Jai Jaikumar Malvi

(Dr. K.S. Rajput) (Dr. C.S. Malvi)

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

Arun S. Kushwah

SATEESH KUMAR

Shashikant Pandey

Jai Kumar

Dr. C.S. Malvi

Dr. R.S. Rajput

ITM UNIVERSITY

Syllabus-2023-2024

(SOET)(BTech-MechanicalEngineering)

Title of the Course	Tribology Engineering
Course Code	MEE0623

Part A

Year		**Semester**		**Credits**	L	T	P	C
					2	1	0	3
Course Type	Theory only							
Course Category	Discipline Electives							
Pre-Requisite/s	Knowledge of basic sciences, material science and machine design		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** To recall the concepts of Engineering Mechanics and machine design **(BL1-Remember)** **CO2-** To understat the concept of tribology engineering**(BL2-Understand)** **CO3-** To apply the tribo design in various machine elements**(BL3-Apply)** **CO4-** To design the components through tribology in lubrication and wear mechanism**(BL4-Analyze)** **CO5-** To evaluate the results of designing which leads to reduction of power consumption in gears, bearings and other contacting parts of machinery**(BL5-Evaluate)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✗ Employability ✗ Professional Ethics ✗ Gender ✗ Human Values ✗ Environment ✗	**SDG (Goals)**	SDG9(Industry Innovation and Infrastructure)					

Arun S. Kushwah

SATEESH KUMAR

Assistant Professor

Jaikumar

Dr. C. S. Mehri

Dr. R. S. Rajput

Part B

Modules	Contents	Pedagogy	Hours
Unit-I	Introduction Introduction to tribology, History of tribology, Interdisciplinary Approach, Principles of tribo design, Tribological problems in machine design, Economic Benefits.	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-III	Wear Wear Mechanisms, Adhesive Wear, Abrasive Wear, Corrosive Wear, Fretting Wear, Wear Analysis	Lectures with whiteboard and PPT,Quiz, Report writing	8
Unit-IV	Lubrication and Lubricants Importance of Lubrication, Boundary Lubrication, Mixed Lubrication, Full Fluid Film Lubrication ; Hydrodynamic, Elastohydrodynamic lubrication, Types & Properties of Lubricants, Lubricants Additives	Lectures with whiteboard/PPT, Quiz, Group discussion	8
Unit-V	Fluid film lubrication Fuid mechanics concepts, Equation of Continuity & Motion, Generalized Reynolds Equation with Compressible & Incompressible Lubricants. Application of Tribology- Introduction, Rolling Contact Bearings, Gears, Journal Bearings, Finite Bearings	Lectures with whiteboard/PPT, Quiz, Group discussion	

Part D(Marks Distribution)

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

Part E

Books	T.A. Stolarski Tribology in Machine Design Butterworth- Heinemann
Articles	
References Books	Dudley D.Fulier Theory and practice of Lubrication for Engineers New York Company, 1998 Moore, Desmond F. Principles and applications of Tribology Pergamon press, 1975 G W Stachowiak, A W Batchelor Engineering Tribology Elsevier publication 1993
MOOC Courses	https://onlinecourses.nptel.ac.in/noc20_mm12/preview
Videos	

Arun S. Kushwah SATEESH KUMAR Shashikant Pandey Jai Kumar Mahi. Dr. C.S. Mahi

Dr. R.S. Rajput

Course Articulation Matrix

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

Arun S. Kushwah

SATEESH KUMAR

Shashikant Pandey

Jai Kumar

Dr. C. S. Malvi

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

UNIVERSITY
GWALIOR-MP-INDIA

Dated: 13/06/2023

Minutes of Meeting (BOS)

In order to review the scheme and syllabus of B.Tech, BCA, BCA (H) and MCA of **Department of CSA, School of Engineering & Technology,** ITM University Gwalior, a meeting of Board of Studies (BOS) was held on **13/06/2023.**

The following members were present in the meeting:

S.No.	Name	Designation	Signature
1.	Dr. M.P. Singh	Professor, Dept. of Computer Science, B.R. Ambedkar University, Agra (Expert)	
2.	Mr. Palash Sharma	Alumni	
3.	Dr. Shashi Kant Gupta	HoD,CSA and Chairman, BOS	
4.	Dr. Pallavi Khatri	Professor (Member)	
5.	Dr. Sanjay Jain	Professor (Member)	
6.	Dr. Geetanjali Surange	Associate Professor (Member)	
7.	Dr. Arun Yadav	Associate Professor (Member)	
8.	Dr. Vani Agrawal	Associate Professor (Member)	
9.	Dr. Nidhi Birthare	Assistant Professor (Member)	
10.	Dr. Ranjeet Singh Tomar,	Dean Academics (Invitee)	
11.	Dr. Manish Sharma	HoD ,Mathematics , (Invitee)	
12.	Dr. Shiv Om Singh	Associate Professor , Deptt of environment Science (Invitee)	
13.	Dr. R.S. Rajput	Associate Professor (Invitee)	

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The following decisions were taken in the BOS meeting:

1. The curriculum is designed to incorporate subjects from various pools as suggested by the AICTE Model curriculum for UG Degree course in Computer Science and Engineering.
2. For the batch 2023-2027, in B.Tech. All specializations, it was decided that students will opt for either NCC or MOOC as a choice-based subject starting from semester I to semester VI.
3. For the batch 2023-2027, in B.Tech. All specializations, the Subject Basics of Electricals and Electronics Engineering EEL0201wasshifted to II semester and Engineering Physics PHL0101 was shifted to I Semester to maintain the balance of subject complexity.
4. For the batch 2023-2027, in B.Tech. all specializations, the Subject Communication Skills & Colloquium HUL0101 was shifted to I semester, and Environmental Science and Global Issues MCL0201 was shifted to II Semester to work on the communication skills of the students from I semester itself as many students have poor communication skills.
5. For the batch 2023-2027, in B.Tech. all specializations, the Subject Engineering Graphics MEL0101 is introduced to add more credits to Engineering Science courses.
6. For the batch 2023-2027, in B.Tech. all specializations, the Subject Making of Modern India was shifted to the I semester so that more core subjects can be added in the second year. Now this is a non-credit course.
7. For the batch 2023-2027, Subject Engineering Mechanics MEL0201 was introduced in the II semesters for all specializations to make them familiar with basic engineering concepts.
8. For the batch 2023-2027, in B.Tech. all specializations except specialization of AI & ML, subject Digital Electronics ECL0205 was shifted from II semester to III semester ECL0305.
9. For the batch 2023-2027, in B.Tech. all specializations subject Web Technology CSP0201 was introduced in II semesters.
10. For the batch 2023-2027, CSL0204 Object Oriented Programming paradigm is renamed as Object Oriented Programming using Java CSL0202 for the II semester.
11. Subject CSP0201 Fundamental of Cyber Security (CSCU) of Cyber Security specialization is removed from the scheme of 2023-2027.
12. Subject CSL0205 Programming in Python which was running in AIML, Cyber Security, and Data Science specialization is removed from II semester in the 2023-2027 scheme.
13. All the semesters having Evaluation of Industrial Training for all the specialization for 2022-2026 and 2023-2027, is renamed as Seminar where evaluation of Industrial training will be done.
14. ECL0327 Analog and Digital Communication is removed from the scheme of the 2023-2027 batch.
15. Subject Discrete Structure and Linear Algebra MAL0305 is renamed as Discrete Structure and Matrices MAL0305 for the batch 2022-2026 and 2023-2027 all specializations.
16. Python Programming CSP0304 is added in the 2023-2027 scheme for all specializations.
17. In place of Making of Modern India MCL0305, Universal Human Values MCAL0301 is included in the scheme of the 2022-2026 batch.
18. CSL0311 Data Communication and Computer Networks of Cyber Security specialization is removed from the scheme of 2022-2026 and 2023-2027 cyber security batch.
19. For the batch 2023-2027 and 2022-2026, for specializations Cyber Security and non-specialization, the subject Server-Side Programming CSP0405 is renamed as Advanced Java CSP0406.

20. For the batch 2023-2027, Numerical Methods is shifted to V semester for the specialization of AI & ML.
21. Minor Project I CSD0503 is removed from the schemes of 2022-2026 and 2023-2027 schemes for all specializations.
22. In the scheme of 2022-2026 and 2023-2027, electives were added from the V semester onwards whereas in 2021-2025 and previous batches schemes, electives were in the VII and VIII semesters.
23. CSL0501 Artificial Intelligence (except AI&ML specialization), CSL0502 Theory of Computation (except Data Science specialization) and CSL0508 Computer System Organization(except Cyber Security and non-specialization) were also added in the schemes of 2022-2026 and 2023-2027 batches.
24. In B.Tech. V semester, for the Data Science Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
        i. CSE0518 Computer Graphics
        ii. CSE0517 Compiler Design
        iii. CSE0516 Fundamentals of R programming
        iv. CSE0525 Natural Language Processing
        v. CSE0526 Digital Image Processing
        vi. CSE0527 Cloud Computing

    b. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
        i. CSL0501 Computer Graphics and Multimedia
        ii. CSL0508 Big Data Tools
        iii. CSL0516 Theory of Computation
        iv. CSL0563 Data Mining and Data Warehousing
        v. CSL0507 Machine Learning

25. In B.Tech. V semester, for the Artificial Intelligence & Machine Learning Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
        i. CSE0510 Internet of Things
        ii. CSE0513 Blockchain
        iii. CSE0511 Big Data
        iv. CSE0521 Introduction to Data Science
        v. CSE0526 Data Mining and Data Warehousing
        vi. CSE0527 Cloud Computing

    b. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
        i. CSL0501 Computer Graphics and Multimedia
        ii. CSL0508 Big Data Tools
        iii. CSL0563 Data Mining and Data Warehousing
26. In B.Tech. V semester, for the Cyber Security Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
        i. CSE0519 Cyber Laws

ii. CSE0513 Blockchain
iii. CSE0515 Distributed DBMS
iv. CSE0529 Fundamentals of Security
v. CSE0528 Essentials of Network Defense
vi. CSE0520Information Retrieval

b. Design and Analysis of Algorithms CSL0507 is added for the specialization
c. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
   i. CSL0501 Computer Graphics and Multimedia
   ii. CSL0521 Digital forensics
   iii. CSP0504 Linux Programming
   iv. CSL0522 Ethical hacking

27. In B.Tech. V semester, for the non-specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
       i. CSE0511 Big Data
       ii. CSE0515 Distributed DBMS
       iii. CSE0529 Fundamentals of Security
       iv. CSE0528 Essentials of Network Defense
       v. CSE0520 Information Retrieval

    b. Design and Analysis of Algorithms CSL0507 is added for the specialization
    c. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
       i. CSL0501 Computer Graphics and Multimedia
       ii. CSL0521 Digital forensics
       iii. CSP0504 Linux Programming
       iv. CSL0522 Ethical hacking
28. In B.Tech. VI semester, for the Data Science Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
       i. CSE0617 Machine Learning
       ii. CSE0616 Internet of Things
       iii. CSE0614 Information Retrieval
       iv. CSE0621 Essentials of Digital Forensics
       v. CSE0625 Web Mining and Semantic Analysis
       vi. CSE0624 Computer Vision

    b. CSL0603 Big Data Analytics and CSL0604 Design and Analysis of Algorithm were also added in the schemes of 2022-2026 and 2023-2027 batches.
    c. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
       i. CSL0661 Digital Image processing
       ii. CSL0662 Compiler Design

iii. CSL0667 Neural Network and Deep Learning
iv. CSL0669 Fundamentals of Cloud Computing

29. In B.Tech. VI semester, for the Artificial Intelligence & Machine Learning Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
        i. CSE0612Quantum Computing
        ii. CSE0615 Cloud Computing
        iii. CSE0613 Information Retrieval
        iv. CSE0628Evolutionary Algorithms
        v. CSE0622Data Analytics & Visualization
        vi. CSE0627Blockchain Technology

    b. CSL0605Soft Computing Techniques and CSL0606Deep Learning were also added in the schemes of 2022-2026 and 2023-2027 batches.
    c. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
        i. CSL0661 Digital Image processing
        ii. CSL0662 Compiler Design
        iii. CSL0667 Neural Network and Deep Learning
        iv. CSL0669 Fundamentals of Cloud Computing
30. In B.Tech. VI semester, for the Cyber Security specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
        i. CSE0619 Essentials of Ethical Hacking
        ii. CSE0617 Machine Learning
        iii. CSE0612 Quantum Computing
        iv. CSE0621 Essentials of Digital Forensics
        v. CSE0629 Network Security
        vi. CSE0626 Incident Response & SOC Fundamentals

    b. CSL0601 Internet of Things and CSL0602 Cloud Computing were also added in the schemes of 2022-2026 and 2023-2027 batches.
    c. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
        i. CSL0621 Computer Forensics
        ii. CSL0662 Compiler Design
        iii. CSL0622 Data Mining & Data warehousing
        iv. CSL0669 Fundamentals of Cloud Computing
31. In B.Tech. VI semester, for the non specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme –
        i. CSE0611 Compiler Design
        ii. CSE0612 Quantum Computing
        iii. CSE0613 Digital Image Processing

iv. CSE0621 Essentials of Digital Forensics
v. CSE0622 Data Analytics & Visualization
vi. CSE0623 Soft Computing

b. CSL0601 Internet of Things and CSL0602 Cloud Computing were also added in the schemes of 2022-2026 and 2023-2027 batches.
c. Removed subjects in the scheme of 2022-2026 and 2023-2027 are
   i. CSL0661 Digital Image Processing is now reflected as an elective subject
   ii. CSL0662 Compiler Design
   iii. CSL0622 Data Mining & Data warehousing
   iv. CSL0669 Fundamentals of Cloud Computing

32. In B.Tech. VII semester, for AI & Machine Learning Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
   a. Following electives were added to the scheme –
      i. CSE0710 – Bioinformatics
      ii. CSE0715 – Cryptography
      iii. CSE0714 –Human-Computer Interaction
      iv. CSE0722 – Computer Vision
      v. CSE0723 – Robotics
      vi. CSE0725 –Engineering Optimization Techniques

   b. CSL0703 Natural Language Processing was added as core subject in VII semester for AI & ML Specialization for 2022-2026 and 2023-2027 batches.
33. In B.Tech. VII semester, for Data Science Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
   a. Following electives were added to the scheme –
      i. CSE0711 – Deep Learning
      ii. CSE0716 – Video Analytics
      iii. CSE0717 –Quantum Computing
      iv. CSE0721 – Cyber Security Fundamentals
      v. CSE0724 – Evolutionary Algorithms
      vi. CSE0725 – Engineering Optimization Techniques

   b. CSL0702 Cryptography was added as core subject in VII semester for Data Science Specialization for 2022-2026 and 2023-2027 batches.
34. In B.Tech. VII semester, for Cyber Security Specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
   a. Following electives were added to the scheme –
      i. CSE0719 – Cloud Security
      ii. CSE0718 – Web Application Security
      iii. CSE0710 – Bioinformatics
      iv. CSE0720 – Big Data Analytics

v. CSE0729 – Threat Intelligence, in 2021-2025 its code was CSE0753
vi. CSE0727 – Information Security & Ethics

b. CSL0704 Cyber Forensics was added in the scheme in place of CSL0722 Advance Cloud Computing

35. In B.Tech. VII semester, for non-specialization batch, the following changes were made for the batches 2022-2026 and 2023-2027 –
    a. Following electives were added to the scheme
        i. CSE0711 – Deep Learning
        ii. CSE0712 – Advance web Technology
        iii. CSE0713 – Full Stack Development
        iv. CSE0721 - Cyber Security Fundamentals and Cyber Law
        v. CSE0728 – Bioinformatics
        vi. CSE0726 – Augmented Reality
36. In B.Tech. all specializations, changes done in VIII semester for batch 2023-2027 and 2022-2026 were –
    a. Communication Skills and Personality Development HUL0801 was removed from VIII semester and shifted from the syllabus.
    b. Credits of Major Project II were changed from 16 to 20 in the scheme.
    c. Credits of the Seminar were changed from 4 to 5 in the scheme.
37. Following Schemes of examination and Syllabus of B.Tech(CSE) have been reviewed and approved.
    a. BCA for the batch 2023-2026
    b. BCA/BCAH for the batch 2022-2025 III–VI Sem
    c. MCA for the batch 2023-2025
    d. B.Tech.(CSE) Batch (2020-2024) VII and VIII semester
    e. B.Tech.(CSE) Batch (2021-2025) V and VI semester
    f. B.Tech.(CSE) Batch (2022-2026) III and IV semester
    g. B.Tech.(CSE) Batch (2023-2027) I and II semester
    h. B. Tech(CSE) -Specialization in Data Science and Machine learning- Batch (2020-2024) VII and VIII semester
    i. B. Tech(CSE) -Specialization in Data Science and Machine learning- Batch (2021-2025) V - VIII semester.
    j. B. Tech(CSE) -Specialization in Artificial Intelligence and Machine learning- Batch (2022-2026) III - VIII semester
    k. B. Tech(CSE) -Specialization in Artificial Intelligence and Machine learning- Batch (2023-2027) I - VIII semester
    l. B. Tech(CSE) -Specialization in Data Science - Batch (2022-2026) III - VIII semester
    m. B. Tech(CSE) -Specialization in Data Science - Batch (2023-2027) I - VIII semester
    n. B. Tech(CSE) -Specialization in Cyber Forensics - Batch (2020-2024) VII and VIII semester
    o. B. Tech(CSE) -Specialization in Cyber Forensics - Batch (2021-2025) V - VIII semester
    p. B. Tech(CSE) -Specialization in Cyber Security – Batch (2022-2026) I - VIII semester
    q. B. Tech(CSE) -Specialization in Cyber Security – Batch (2023-2027) III - VIII semester
38. The syllabus of BCA /BCA(Honors) is re structured and 3 years scheme syllabus was redesigned as per NEP 2020 and corresponding guidelines of UGC for 4 years degree programs.

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39. The curriculum is designed to incorporate subjects from various pools as suggested by UGC under the following categories: CC- Core Competency, AEC- Ability Enhancement Course, SEC – Skill Enhancement Course, DSE- Discipline Specific Education, VAC- Value added Course and the distribution of credits is as follows:

S.No.	Particulars	Number of Courses	Total Credit	%
1	CC	16	64	51%
2	AEC	5	10	8%
3	SEC	6	13	10%
4	CE	4	16	13%
5	DSE	4	14	11%
6	VAC	6	6	4%
7	OE	1	2	1%
Total		41	125	

40. For the batch 2022-2025, the scheme of BCA and BCA(Hons) semester III, IV, V and semester VI was approved (annexure I and II respectively).
41. The scheme of study and examination for MCA for the batch 2023-2025 was approved as per annexure III.
42. The courses in various categories as mentioned in point no. 3 are added to various semesters of BCA Scheme 2022-25 and as follows:

S.No.	Name of Course	Course category	Added in semester
1	BCA 107/ Office Management Tools	VAC	I
2	BCA 206 /Computer Assembling and Repair	SEC	II
3	BCA 207 / Health and Wellness	VAC	II
4	BCA 305 / Reasoning and Aptitude	AEC	III
5	BCA 306 / Soft Skills	SEC	III
6	BCA 307 / Indian Constitution	VAC	III
7	BCA 406 / Entrepreneurship Development	AEC	IV
8	BCA 407 / Universal Human Values	VAC	IV

9	BCA 505 / Internship Evaluation	SEC	V
10	BCA 506 / Management Information System	AEC	V
11	BCA 507 / Democracy and Good Governance	VAC	V
12	BCAH604 / Mobile Computing	DSE	VI
13	BCAH605 /Physical Education	AEC	VI
14	BCAH607 / Human Resource Management	VAC	VI

43. One MOOC Course is added to each semester as optional credit course from III semester onwards for professional skill development in the scheme of batches 2022-2025 and 2023-2026.

44. The expert suggested creating a pool of Open electives for programs other than computer science or applications and offering them to all students of the university.

45. Following changes were done in the Scheme of BCA 2021-24 / BCAH 2021-24 to make it compatible with NEP -2020

S. No.	Subject in 2021-24 scheme		Changed in scheme 2022-25	
	Subject	Semester		
1	BCAH 302 /Computer Networks	III	BCAH 302 / Web Technology	III
2	BCAH -301 / Discrete Mathematics	III	BCAH 304/ Numerical Methods	III
3	BCAH 304 / Data Structures	III	BCAH 305 /Fundamentals of IOT	III
4	BCAH 401/ Internet and Its Applications	IV	BCAH 401 / Web Designing with PHP	IV
5	BCAH 501 / Numerical Methods	V	BCAH 501 / Netwrok Security	V
6	BCAH 502 / Computer Graphics	V	BCAH 503 / Elective II	V
7	BCA 503/ Fundamentals of Cloud Computing	V	BCAH 502 / Elective I (having Cloud Computing as one of the options)	V
8	BCAH 503 / Web Designing with PHP	V	BCAH 504 / Data Communication and	V

			Computer Networks	
9	BCAH 601/ Software Project Management	VI	BCAH 604 / Mobile Computing	VI
10	BCAH 602 / Multimedia Systems	VI	BCAH 602 Elective III (having Graphics and Multimedia as an option)	VI

46. Scheme and Syllabus of the following new courses were approved for BCA

Program	Course Code	Course name	Semester
BCA	Computer Assembling and Repair	BCA -206	II
BCA	Health and Wellness	BCA 207	II
BCA	Research Methodology	BCA 701	VII
BCA	Research Publication Ethics	BCA 702	VII
BCA	Dissertation	BCA 801	VIII
BCA	Office Management Tools	BCA-107[P]	I

The Board of Studies recommended above discussed point's further for approval by Academic Council of the University.

Annexure1- Syllabus of new courses

(Dr. Shashi Kant Gupta)

Chairman, BOS
Department of CSA
ITM University Gwalior

ITM UNIVERSITY
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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Computer Assembling and Repair
Course Code	BCA -206

Part A

Year		**Semester**		**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

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Health and Wellness
Course Code	BCA 207

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Ability Enhancement Courses							
Pre-Requisite/s	Successful high school completion of Dynamics of Health Care in Society		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** Know the concept of health &Wellness() **CO2-** Discuss the mind –body relationship() **CO3-** Understand the global health issues & Illustrate the Health beliefs in your country .() **CO4-** Analyze the sanitation services in your locality() **CO5-** Evaluate a mass media program of health awareness()							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✓ Environment ✕		**SDG (Goals)**					

Part B

Modules	Contents	Pedagogy	Hours
Unit-1	• Definition & meaning of the term health. • Importance of health in everyday life. •Components of health – physical, mental , spiritual and its importance.	Yoga,Quiz,Sports	
Unit-2	Concept of wellness. • Mental health & wellness. • Determinants of health • Role of mass media for health promotion. .	Yoga,Quiz,Sports	
Unit-3	Health concept of mind body relation . • Implication of mind body connections. • Concept of wellbeing. • Digital Wellbeing.	Yoga,Sports	
Unit-4	• Understanding health beliefs. • Promoting Human strength & life and enhancement. • Classification of human strength. • Cultivating inner strength Global Health Issues	Yoga,Sports	
Unit-5	Communicable, Non-Communicable disease and their prevention • Malnutrition, Food Adulteration, Environmental Pollution and Sanitation, Population and their management. • Physical Activity and Nutrition, Overweight and Obesity, Mental Health	Yoga,Sports,Debate	

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	Puri .k. Chandra S.S (2005) "Health and Physical Education" New Delhi : Surjeet Publication
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	-	-	-	-	2	-	-	3	-	-
CO2	-	-	-	-	-	-	1	-	-	-	2	-	-	3	-
CO3	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO4	-	1	2	-	-	-	-	-	-	-	-	-	1	3	-
CO5	-	1	-	2	-	-	-	-	-	-	-	-	-	2	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Research Methodology
Course Code	BCA 701

Part A

Year		**Semester**		**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	Interactive Lectures, Case Studies, Experiential Learning	9

	TEMPLATE, Calculations of Impact factor of a journal, citation Index, ISBN & ISSN.		

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	-

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Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Research Publication Ethics
Course Code	BCA 702

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Big Data Analytics
Course Code	BCA 703- B(T)

Part A

Year		**Semester**		**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

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Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Deep Learning
Course Code	BCA 703-A(T)

Part A

Year		**Semester**		**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/	Lectures with whiteboard/PPT, Recorded video, Demonstrations Simulations lab	10

	imagerecognition, video analysis, NLP, medical science etc.		

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

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Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Dissertation
Course Code	BCA 801

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BCA)

Title of the Course	Office Management Tools
Course Code	BCA-107[P]

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Disciplinary Minor							
Pre-Requisite/s			**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** To remember various concept of Information Technology, Computer System, various peripherals, I/o devices, and storage devices.**(BL1-Remember)** **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	Basic Skills In and out view of different components of computer (Hardware), booting the machine, GUI of desktop, input and output interfacing.	Lecturing	9
Unit 2	Microsoft Word Introduction Word - Uses of Word Processor – Working with Word - Explore the use of graphics and different fonts, understand and to make use of basic features of documents, Advanced Word Processing - Managing Document Changes - Advanced Editing and Formatting - Protecting and Sharing Documents - Customizing Documents - Using Macros, Quick parts, and Content Links - Using Fields, Forms and Indexes.	Lecturing	8
Unit 3	Excel [Spreadsheets] Introduction Spreadsheets - Uses of Spreadsheets - Anatomy of a Spreadsheet - Creating a Spreadsheet - Formatting a Spreadsheet- Explore the tools available in spreadsheets, including formulas and calculations, Inserting and working on Graphs, Using office backstage - Using basic formulas - Using functions -Formatting cells and Ranges - Formatting worksheets - Managing worksheets - Working with data and Macros - Using advanced formulas - Securing and sharing workbooks - Creating charts - Adding pictures and shapes to a worksheet.	Lecturing,Experiment	9
Unit 4	Power Point Presentation Introduction Power point presentation (PPT) – Uses of PPT - Creating and Formatting a Presentation - Slide Show Mode, Speaker Notes, and Outline Mode - Drawing Diagrams - Tables and Charts, review each slide template - Duplicate, move and import slides - Insert pictures and video clips - manage add-ins and security options - Create handouts - Create and apply master slides - Manage proofing options - manage language options - Use "Presenter Tools"- Connect to the projection system.	Lecturing,Experiment	9
Unit 5	Use of Excel for Statistical Analysis Data Classification and Presentation - Cumulative Frequency Distribution - Bivariate Frequency Distributions - Tabulation of Data - Graphical Representation - Other Forms of Representation Measures of Location and Dispersion - The Arithmetic Mean – The Median – The Mode – Geometric and Harmonic Mean – Other methods of Location: Quartiles, Deciles and Percentiles – Measures of Variations or Dispersion – The Variance and Standard Deviation. Correlation - Scatter diagram – correlation coefficient Overview of Microsoft Access	Lecturing,Experiment	10

	Databases – Design and Create Tables to Store Data – Simplify Data Entry with Forms - Obtain Valuable Information Using Queries - Create Professional Quality Output with Reports – Design and Implement Powerful Relational Databases - Build User Friendly Database Systems.		

Part C

Part D(Marks Distribution)

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

Part E

Books	Alexander, M., & Kusleika, R. (2015b). Access 2016 Bible. John Wiley & Sons. Berk, K. N. (2006b). Data Analysis with Microsoft Excel.
Articles	
References Books	
MOOC Courses	
Videos	

Course Articulation Matrix

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

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DEPARTMENT OF ELECTRICAL ENGINEERING

ITM University Gwalior Campus, NH-44, Turari, Gwalior, (M.P.) - 475 001 INDIA
mail: info@itmuniversity.ac.in, web: www.itmuniversity.ac.in

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Power System Stability
Course Code	EEL 0542

Part A

Year		**Semester**		**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	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Power System Protection
Course Code	EEL 0643

Part A

Year		**Semester**		**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 offaults, 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 barprotection. 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, sulphurhexa fluride (SF6) and vacuum circuit breakers	Talks and presentations	12
Unit-5	Switchgear II: Rating selection and testing ofcircuit 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 RESETVALUE.	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Power System Protection
Course Code	EEL 0643

Part A

Year		**Semester**		**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

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Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Introduction of Electric Vehicle Technology
Course Code	EEL0132

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Circuit Theory and Networks
Course Code	EEL0302

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ITM UNIVERSITY
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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Electrical & Electronic Materials
Course Code	EEL0304

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	0	0	3
Course Type	Theory only							
Course Category	Disciplinary Minor							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level	**CO1-** to understand different conducting materials**(BL2-Understand)** **CO2-** to understand different semiconducting materials**(BL2-Understand)** **CO3-** to understand different magnetic materials**(BL2-Understand)** **CO4-** to understand different insulating materials**(BL2-Understand)** **CO5-** to classify different materials**(BL3-Apply)**							
Coures Elements	Skill Development ✓ Entrepreneurship ✕ Employability ✕ Professional Ethics ✕ Gender ✕ Human Values ✕ Environment ✓	**SDG (Goals)**						

Part B

Modules	Contents	Pedagogy	Hours
1	Conducting Material: Classification and main properties, High resistivity alloy: Constantan Manganin, Nichrome, properties of copper, Aluminum, steel tungsten, Molybdenum, Platinum, Tantalum, Niobium, Mercury, Nickel, Titanium, Carbon, Lead, thermocouple, materials, specific resistance, conductance, variation of resistance with temperature, super conductors.	Talks and presentations	10
2	Semi Conductor Materials: General conception, variation of electrical conductivity, Elements having semiconductor properties, general application, hall effect, energy levels, conduction in semiconductors, Intrinsic conduction, impurity conduction, P and N type impurities, electrical charge, Drift, Mobility current flow in semi conductors P-N junction formation by alloying, (forward and reverse) of P-n junction, Reverse separation current.	Talks and presentations	9
3	Magnetic Materials: Details of magnetic materials, relation between B. H. and μ, soft and hard magnetic materials. Di-magnetic, Para magnetic and Ferromagnetic materials, electrical sheet steel, cast iron. Permanent magnetic materials. Dynamic and static hysteresis loop. Hysteresis loss, eddy current loss, Magnetization, magnetic susceptibility, coercive force, core temperature, rectangular hysteresis loops.	Talks and presentations	8
4	Insulating Materials: General electrical mechanical and chemical properties of insulating material, Electrical characteristics volume and surface resistivity complex permittivity loss, and dielectric loss, equivalent circuits of an imperfect dielectric polarization and polarisability classification of dielectric.	Talks and presentations	9
5	Classification of insulating materials on the basis of temperature rise. General properties of transformer oil, commonly used varnishes, solidifying insulating materials, resins, bituminous waxes, drying oils, Fibrous insulating materials, wood, paper and cardboard, insulating textiles, varnished adhesive tapes, inorganic fibrous material and other insulating materials, such as mica, ceramic, Bakelite, ebonite, glass, PVC, rubber, other plastic molded materials.	Talks and presentations	9

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	22

Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**

Part E

Books	Text Books: 1. A.J.Dekker: Electrical Engineering Materials PHI 2. Indulkar and S. Thruvengadem; Electrical Engineering Materials; S. Chand
Articles	
References Books	References: 1. Kortisky; Electrical Engineering Materials: 2. Electrical Engineering Material s & Devices; John Allison ;TMH 3. Materials for Electrical Engineering: B.M. Tareev. 4. Anderson; Di-Electrics :
MOOC Courses	
Videos	

Course Articulation Matrix

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

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Energy Storage Systems for electric vehicles
Course Code	EEL0334

Part A

Year		**Semester**		**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 ofenergy storage, needs and opportunities in energy storage, Technology overview and key disciplines, comparison of time scale of storages and applications, Energy storage inthe 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 parametersHeat generation- Battery design- Performance criteria for Electric vehicles batteries- Vehicle propulsion factors- Power and energy requirements of batteries- Meeting battery performance criteria- settingnew 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 ofcells, safety vents, Explosions: Causes of battery explosions, explosive process.	talks and presentations	9

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
I	Develop a comparative case Study of different types of batteries with their characteristics & detailed specifications.	Experiments	BL2-Understand	2
II	Perform Vibration Test for traction batteries (Lead-Acid/Li-ion) as per AIS 048 standard.	Experiments	BL4-Analyze	2
II	Perform Shock Test for traction batteries (Lead-Acid/Li-ion) as per AIS 048 standard.	Experiments	BL5-Evaluate	2
III	SOC Estimation by Open Source voltage for Lead-Acid battery, Ni-MH battery and Liion battery	Experiments	BL4-Analyze	2
III	SOC Estimation by specific gravity for Lead-Acid battery.	Experiments	BL5-Evaluate	2
IV	Design a circuit for Battery monitoring System for Lead acid battery.	Experiments	BL4-Analyze	2
V	Series connection of batteries.	Experiments	BL5-Evaluate	2
V	Prallel connection of batteries	Experiments	BL5-Evaluate	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	22
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	20

Part E

Books	1.Energy Resource Management, Krupal Singh Jogi (Sarup & Sons). 2. Non-Conventional Energy resources, Dr. B.H. Khan, Tata McGraw Hill. 3. Electrochemical Energy Storage: Physics and Chemistry of Batteries, De Gryuter, Reinhart Job. 4. Batteries: Materials Principles and Characterization Methods, Chen Liao, Chemical Sciences and Engineering Division, Argonne National Laboratory, Lemont, USA. 5. Batteries, Fuel Cells, and related Electrochemistry, U.S. Department of Energy, Washington, D.C. 2058
Articles	
References Books	1..Encyclopaedia of Automotive Engineering edited by David Crolla et al, Wiley, 2014 2. Design and Control of Automotive Propulsion Systems by Zongxuan Sun and Guoming Zhu, CRC Press, 2015 3. The Automotive Transmission Book by Robert Fischer, Ferit Küçükay, Gunter Jürgens, Rolf Najork, and Burkhard Pollak, Springer, 2015 4. Noise and Vibration Control in Automotive Bodies by Jian Pang, Wiley.
MOOC Courses	1.https://nptel.ac.in/courses/108106170 2.https://onlinecourses.nptel.ac.in/noc22_ee53/preview
Videos	1.https://www.youtube.com/watch?v=mNOYS-duUJY 2.https://www.youtube.com/watch?v=nrxmQhbZUTc&t=100s

Course Articulation Matrix

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

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Digital Electronics and Logic Design
Course Code	EEL0340

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Electric and Hybrid Vehicles
Course Code	EEL0435

Part A

Year		**Semester**		**Credits**	L	T	P	C
					3	1	2	6
Course Type	Embedded theory and lab							
Course Category	Discipline Core							
Pre-Requisite/s	Basic understanding of EV		**Co-Requisite/s**					
Course Outcomes & Bloom's Level	**CO1-** Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources**(BL1-Remember)** **CO2-** Design and develop basic schemes of electric vehicles and hybrid electric vehicles**(BL2-Understand)** **CO3-** Choose proper energy storage systems for vehicle application**(BL3-Apply)** **CO4-** Identify various communication protocols and technologies used in vehicle networks**(BL5-Evaluate)**							
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
I	Introduction to Hybrid Electric Vehicles: History of Hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.	talks and presentation	9
II	Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis. Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.	talks and presentation	8
III	Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives	talks and presentation, PBL	9
IV	Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power ,electronics, selecting the energy storage technology	talks and presentation, PBL	8
V	Communications, supporting subsystems: In vehicle networks- CAN, Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies	talks and presentation	10

Part C

Modules	Title	Indicative-ABCA/PBL/ Experiments/Field work/ Internships	Bloom's Level	Hours
III	Vector control of PMSM and IM drives over complete drive cycle of EV	Experiments	BL5-Evaluate	2
III	Characterization of power, torque and efficiency for EV over drive cycle	Experiments	BL5-Evaluate	2
II	Power flow in EV power train during charging, V2G feeding, motoring and braking	Experiments	BL4-Analyze	2
IV	Forward & backward motoring and regenerative braking of EV consisting of multiple motor- drives	Experiments	BL3-Apply	2
V	Synchronized PWM techniques for high-power and high-speed IM drives	Experiments	BL2-Understand	2
V	Working with the CAN communication	Experiments	BL2-Understand	2
I	Experiments on Type-I onboard charger	Experiments	BL6-Create	2

Part D(Marks Distribution)

Theory					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	40	60	18	40	22
Practical					
Total Marks	**Minimum Passing Marks**	**External Evaluation**	**Min. External Evaluation**	**Internal Evaluation**	**Min. Internal Evaluation**
100	50	60	30	40	20

Part E

Books	1.Tom Denton, "Automotive Electrical and Electronic Systems", 5th Edition, Routledge 2.Tom Denton, "Automotive Electrical and Electronic Systems", 5th Edition, Routledge 3.Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003
Articles	1.E. Karden, S. Ploumen, B. Fricke, T. Miller and K. Snyder, "Energy storage devices for future hybrid electric vehicles," J. Power Sources, vol. 168, no. 1, pp. 2–11, 2007
References Books	1.Berker B., James W. J. & A. Emadi, "Switched Reluctance Motor Drives", CRC Press
MOOC Courses	1.https://onlinecourses.nptel.ac.in/noc22_ee53/preview Electric Vehicles - Part 1 By Prof. Amit Jain | IIT Delhi 2.https://nptel.ac.in/courses/108106170 Institute Logo NOC:Fundamentals of Electric vehicles: Technology & Economics, IIT Madras Prof. Ashok Jhunjhunwala Prof. Prabhjot Kaur Prof. Kaushal Kumar Jha Prof. L Kannan
Videos	1.Berker B., James W. J. & A. Emadi, "Switched Reluctance Motor Drives", CRC Press 2.Berker B., James W. J. & A. Emadi, "Switched Reluctance Motor Drives", CRC Press 3.https://www.youtube.com/watch?v=CWulQ1ZSE3c

Course Articulation Matrix

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

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Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Power Generation Transmission and Distribution
Course Code	EEL0441

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

ITM UNIVERSITY
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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Electric Vehicles Control
Course Code	EEL0536

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Vehicle Dynamics
Course Code	EEL0637

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Power system operation & Control
Course Code	EEL0839

Part A

Year		**Semester**		**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 SYSTEMOPERATION 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 basicconcepts of load dispatching - load forecasting - Basics of speed governing mechanisms and modeling - speed load characteristics - regulation of two generatorsin 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 transmissionline - 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 ofthermal 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 ofUC 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 - SCADAand EMS functions - state estimation problem – measurements and errors - weighted least square estimation - variousoperating 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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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CELEBRATING DREAMS

Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Energy Management & Audit
Course Code	EEM0716

Part A

Year		**Semester**		**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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Syllabus-2023-2024

(SOET)(BTech-ElectricalEngineering)

Title of the Course	Electrical workshop practice
Course Code	EEP0101

Part A

Year		**Semester**		**Credits**	L	T	P	C
					0	0	2	2
Course Type	Lab only							
Course Category	Discipline Core							
Pre-Requisite/s				**Co-Requisite/s**				
Course Outcomes & Bloom's Level								
Coures Elements	Skill Development ✕ 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	Study and performance of different types of WIRE JOINTS	Experiments	BL3-Apply	2
2	Study and performance of GODOWN WIRING	Experiments	BL3-Apply	2
3	Study and performance of STAIRCASE WIRING	Experiments	BL3-Apply	2
4	Series and Parallel connection of Bulbs and Power sockets by single switch and multi switches	Experiments	BL4-Analyze	2
5	Assembling and soldering of 9V DC electronic DISCO LIGHT circuit with demonstration	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	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	-	-
CO2	-	1	-	-	1	-	-	-	1	-	-	-	-	-	1
CO3	-	-	21	-	-	-	-	-	-	2	-	2	-	-	-
CO4	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	1	-	-	-	2	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-

OMVEER SINGH

Digitally signed by OMVEER SINGH
DN: cn=OMVEER SINGH c=IN o=Personal
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