MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution Affiliated to VTU, Belagavi)

Autonomous Programme

Bachelor of Engineering

Department of

Electrical and Electronics Engineering

SCHEME AND SYLLABUS

(2025 Admitted Batch)

Dr. RAJANNA S. M.Tech.,Ph.D.,(IITR)
Professor & Head
Dept of E&E Engineering
Malnad College of Engineering
HASSAN 573202

Academic Year 2026-27

VISION OF THE INSTITUTE

To be an institute of excellence in engineering education and research, producing socially responsible professionals.

MISSION OF THE INSTITUTE

1. Create conducive environment for learning and research
2. Establish industry and academia collaborations
3. Ensure professional and ethical values in all institutional endeavors

VISION OF THE DEPARTMENT

To become a department of excellence in the domain of Electrical and Electronics Engineering producing competent engineers with research acumen having moral and social values.

MISSION OF THE DEPARTMENT

1. Enhance industry and alumni interaction.
2. Promote continuous quality up gradation of faculty and technical staff.
3. Time to time modernization of departmental infrastructure to provide state of the art laboratories.
4. Create research-oriented culture to invoke the desire and ability of lifelong learning among the students for pursuing successful career.
5. Create and sustain environment of learning in which students acquire knowledge and learn to apply it professionally with due consideration of social and ethical values.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of the program will be able to

PEO 1: Pursue a diverse range of career as engineers and researchers.

PEO 2: Design and develop innovative systems to provide best solutions to electrical engineering problems.

PEO 3: Learn and adapt in a world of constantly evolving technology.

PROGRAM OUTCOMES (POS)

PO 1: **Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO 2: **Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO 3: **Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO 4: **Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO 5: **Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO 6: **The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO 7: **Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO 8: **Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO 9: **Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO 10: **Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO 11: **Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

KNOWLEDGE AND ATTITUDE PROFILE (WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Acquire core competency in analyzing, designing and controlling electrical and electronic systems to meet industrial and societal needs.

PSO 2: Adopt technology by leveraging state-of-the-art and AI tools to develop innovative solutions in emerging areas like renewable energy, electric vehicles and embedded systems.

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CIE and SEE Assessment Structure for 2025 batch onwards

Examination	Maximum Marks	Minimum marks to qualify
CIE	50	20 (12+8)
SEE	50	20
Total	**100**	**40**

Assessment Structure for Theory Courses

Assessment	Marks
CIE 1 – conducted for 50 marks and scaled down to 15 marks	15
CIE 2 – conducted for 50 marks and scaled down to 15 marks	15
Activities as decided by course faculty	20
SEE – conducted for 100 and scaled down to 50	50
Total	**100**

CIE Assessment Structure

Assessment	Marks	Syllabus
CIE 1 - Conducted for 50 marks and scaled down to 15 marks	**15**	Module-1 and Module-2
CIE 2 - Conducted for 50 marks and scaled down to 15 marks	**15**	Module–3 and Module-4
Activities as decided by course faculty	**20**	All Modules
Total	**50**	

CIE 1 Question Paper Pattern

Question 1	Module-1	Mandatory	One question for 20 marks – maximum 4 sub divisions
Question 2	Module-2	Internal choice	Two questions for 20 marks each, out of which, student has to answer one question – maximum 4 sub divisions
Question 3	Module-1 and Module-2	Mandatory	One question for 10 marks – maximum 5 sub divisions – short answer types

CIE 2 Question Paper Pattern

Question 1	Module-3	Mandatory	One question for 20 marks – maximum 4 sub divisions
Question 2	Module-4	Internal choice	Two questions for 20 marks each, out of which, student has to answer one question – maximum 4 sub divisions
Question 3	Module-3 and Module-4	Mandatory	One question for 10 marks – maximum 5 sub divisions – short answer types

SEE Question Paper Pattern

Question 1	Module -1	Mandatory	One question for 20 marks – maximum 4 sub divisions
Question 2	Module -2	Internal choice	Two questions for 20 marks each, out of which, student has to answer one question - maximum 4 sub divisions
Question 3	Module -3	Internal choice	Two questions for 20 marks each, out of which, student has to answer one question - maximum 4 sub divisions
Question 4	Module -4	Internal choice	Two questions for 20 marks each, out of which, student has to answer one question - maximum 4 sub divisions
Question 5	Module – 1, 2, 3, 4	Mandatory	One question for 20 marks – maximum 5 sub divisions – short answer types

Assessment Structure for Exclusive Laboratory Courses

Assessment	Marks	Minimum marks to qualify
Continuous Evaluation in every lab session by the Course Coordinator	30	12
Laboratory CIE - conducted for 50 marks and scaled down to 20	20	8
SEE	50	20
Total	**100**	**40**

1. The laboratory syllabus shall consist of PART-A and PART-B. PART-A has shall have minimum of 10 fixed set of experiments. PART-B shall have minimum of 10 open-ended experiments.
2. Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.
3. Both PART-A and PART-B are considered for CIE and SEE.
4. Students have to answer 1(one) question from PART-A and 1(one) question from PART-B.
5. The questions for CIE and SEE shall be included from among the experiments under PART-A and shall be evaluated for 25 marks out of the maximum 50 marks.
6. The open-ended question set for CIE and SEE shall be any other open-ended question not done in regular lab sessions under PART-B and shall be evaluated for 25 marks out of the maximum 50 marks.
7. The student shall be evaluated in every lab session for 30 marks and finally the average of all evaluations shall be considered as continuous evaluation for 30 marks.

Assessment Structure for Integrated Laboratory Courses (20 Marks)

Assessment	Marks	Minimum marks to qualify
Continuous Evaluation in every lab session by the Course Coordinator	30	12
Laboratory CIE - conducted for 50 marks and scaled down to 20	20	8
Total	**50**	**20**
***** Integrated Lab Course marks shall be scaled down to 20**		

1. The laboratory syllabus shall consist of PART-A and PART-B. PART-A has shall have minimum of 10 fixed set experiments. PART-B shall have minimum of 10 open-ended experiments.
2. Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.
3. Both PART-A and PART-B are considered for CIE.
4. Students have to answer 1(one) question from PART-A and 1(one) question from PART-B.
5. The questions for CIE shall be included from among the experiments under PART-A and shall be evaluated for 25 marks out of the maximum 50 marks.
6. The open-ended question set for CIE shall be any other open-ended question not done in regular lab sessions under PART-B and shall be evaluated for 25 marks out of the maximum 50 marks.
7. The student shall be evaluated in every lab session for 30 marks and finally the average of all evaluations shall be considered as continuous evaluation for 30 marks.

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Rubrics for Continuous Evaluation in Laboratory Courses (30 marks)

Performance Indicators	Excellent	Very Good	Good	Satisfactory
Fundamental Knowledge : Understanding the problem statement (4 Marks)	The student has in-depth depth knowledge of the topics related to the course (4)	Student has good knowledge of some of the topics related to course (3)	Student is capable of narrating the answer but not capable to show in depth knowledge (2)	Student has not understood the concepts clearly (1)
Design Of Experiment (5 Marks)	Student is capable of discussing more than one design for his/her problem statement and capable of proving the best suitable design with proper reason (5)	Student is capable of discussing few designs for his/her problem statement but not capable of selecting best (4)	Student is capable of discussing single design with its merits and de-merits (2-3)	Student is capable of explaining the design (1)
Implementation (8 Marks)	Student is capable of implementing the design with best suitable algorithm considering optimal solution. (7-8)	Student is capable of implementing the design with best suitable algorithm and should be capable of explaining it (5-6)	Student is capable of implementing the design with proper explanation. (3-4)	Student is capable of implementing the design. (1-2)
Result & Analysis (5 Marks)	Student is able to run the program on various cases and compare the result with proper analysis. (5)	Student will be able to run the program for all the cases. (4)	Student will be able to run the code for few cases and analyze the output. (2-3)	Student will be able to run the program but not able to analyze the output. (1)
Demonstration and Documentation (8 Marks)	Demonstration is very good. The lab record is well organized, with clear sections (e.g., Introduction, Method, Results, and Conclusion). Transitions	Demonstration is good. The lab record is organized, with clear sections, but some sections are not well defined. (5-6)	Demonstration is not clear. The lab record lacks clear organization or structure. Some sections are unclear or incomplete. (3-4)	Demonstration is very poor. The lab record is poorly organized, with missing or unclear sections. (1-2)

	between sections are smooth. (7-8)			

Rubrics for CIE/SEE Test in Laboratory Courses

Performance Indicators	Superior(5)	Good(4)	Fair(3)	Needs Improvement(2)	Unacceptable(1)
Understanding of Experimental Principle	Excellent	Good	Satisfactory	Limited	Poor
Experimental Execution	Independent execution	Minor procedural errors	With guidance	Significant errors	Unable
Observation, Result & Interpretation	Accurate and scientific	Minor errors	Basic	Limited	Incorrect
Open-ended Problem Solving	Independent design	Good approach	Basic solution	Limited	Unable
Viva Voce & Scientific Communication	Excellent	Good	Satisfactory	Limited	Unable

COURSE TYPES

Basic Science Course	BSC
Applied Science Course	ASC
Engineering Science Course	ESC
Emerging Technology Course	ETC
Programming Language Course	PLC
Professional Core Course	PCC
Integrated Professional Core Course	IPCC
Professional Core Course Laboratory	PCCL
Professional Elective Course	PEC
Open Elective Course	OEC
Project/Mini Project/Internship	PI
Humanities and Social Sciences, Management Course	HSMC
Ability Enhancement Course	AEC
Skill Enhancement Course	SEC
Skill Development Course	SDC
Universal Human Value Course	UHV
Non-credit Mandatory Course	NCMC

Semester-wise Credit Distribution

Curricular Component / Semester	I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course (BSC)	8	8	-	1	3	-	-	-	**20**
Applied Science Course (ASC)	-	-	3	-	-	-	-	-	**03**
Engineering Science Course (ESC)/ Emerging Technology Course (ETC)/Programming Language Course	9	9	-	-	-	-	-	-	**18**
Professional Core Course (PCC)	-	-	10	13	6	9	6	-	**44**
Integrated Professional Core Course (IPCC)	-	-	4	4	4	-	4	-	**16**
Professional Core Course Laboratory (PCCL)	-	-	1	1	1	2	-	-	**05**
Professional Elective Course (PEC)	-	-	-	-	3	3	6	3	**15**
Open Elective Course (OEC)	-	-	-	-	-	3	-	3	**06**
Project//Internship (PI)	-	-	-	-	-	3	7	9	**19**
Humanities and Social Sciences, Management Course (HSMC)	1	2	-	-	1	-	-	-	**04**
Ability Enhancement Course (AEC)/ Skill Enhancement Course (SEC)	2	1	1	1	1	1	-	-	**07**
Skill Development Course (SDC)	-	-	1	1	1	-	-	-	**03**
Total Credits	**20**	**20**	**20**	**21**	**20**	**21**	**23**	**15**	**160**

THIRD SEMESTER												
Sl. No	**Course Category**	**Course Code**	**Course Title**	**Teaching Hours per Semester**					**Exam Marks**			**Credits**
				L	**T**	**P**	**TW + SL**	**Total**	**CIE**	**SEE**	**Total**	
1	ASC	25MA301	Mathematics -III for Electrical and Electronics Engineering	42	0	0	48	90	50	50	100	3
2	IPCC	25EE302	Analog Electronic Circuits	42	0	28	50	120	50	50	100	4
3	PCC	25EE303	Electrical Network Analysis	42	28	0	50	120	50	50	100	4
4	PCC	25EE304	Digital Electronic Circuits	42	0	0	48	90	50	50	100	3
5	PCC	25EE305	Transformer and Induction Machines	42	0	0	48	90	50	50	100	3
6	PCCL	25EE306	Transformer and Induction Machines Laboratory	0	0	28	02	30	50	50	100	1
7	AEC	25AEEE3X	Ability Enhancement Course - III	0	0	28	02	30	50	50	100	1
8	SDC	25SCR	Community Project (Project-Based Learning)/ Societal Project	0	0	0	30	30	50	50	100	1
9	AEC	25PT1	Placement Training I	14	0	0	16	30	100	-	100	Audit
10	NCMC	25NYP1	NSS,YOGA,PE	0	0	0	28	28	100	-	100	Audit
11	NCMC	25BCM301	Bridge Mathematics-I (Non-Credit Mandatory Audit Course for Diploma entry students)	14	0	0	14	28	100	-	100	Audit
Total							**336**	**686**	**700**	**400**	**1100**	**20**

ABILITY ENHANCEMENT COURSE – III			
25AEEE31	Python Programming for Electrical Engineering	25AEEE33	Simulation of Circuits Laboratory
25AEEE32	Electrical Measurements Laboratory	25AEEE34	Scilab/ MATLAB for Electrical Engineering

Note:

This scheme is as per the new National Credit Framework, which accounts for 30 hours of learning as equivalent to 1 credit

L: Lecture; T: Tutorial; P: Practical/Drawing; TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.);

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

FOURTH SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW + SL	Total	CIE	SEE	Total	
1	PCC	25EE401	Electric Power Generation and Transmission	56	0	0	64	120	50	50	100	4
2	IPCC	25EE402	Microcontrollers	42	0	28	50	120	50	50	100	4
3	PCC	25EE403	DC and Synchronous Machines	42	0	0	48	90	50	50	100	3
4	PCC	25EE404	Operational Amplifiers and Linear ICs	42	0	0	48	90	50	50	100	3
5	PCC	25EE405	Signals and Digital Signal Processing	42	0	0	48	90	50	50	100	3
6	PCCL	25EE406	Digital Electronic Circuits Laboratory	0	0	28	02	30	50	50	100	1
7	AEC	25AEEE4X	Ability Enhancement Course - IV	0	0	28	02	30	50	50	100	1
8	SDC	25EVS	Environmental Science Project	0	0	0	30	30	50	50	100	1
9	BSC	25BE41	Biology for Engineers	14	0	0	16	30	50	50	100	1
10	AEC	25PT2	Placement Training II	14	0	0	16	30	100	-	100	Audit
11	NCMC	25NYP2	NSS,YOGA,PE	0	0	0	28	28	100	-	100	Audit
12	NCMC	25BCM401	Bridge Mathematics-I (Non-Credit Mandatory Audit Course for Diploma entry students)	14	0	0	14	28	100	-	100	Audit
Total							**336**	**716**	**750**	**450**	**1200**	**21**

ABILITY ENHANCEMENT COURSE – IV			
25AEEE41	Web Technology Laboratory	25AEEE43	PCB Design Laboratory
25AEEE42	Data Structures Laboratory	25AEEE44	IoT Laboratory

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SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

FIFTH SEMESTER												
Sl. No	**Course Category**	**Course Code**	**Course Title**	**Teaching Hours per Semester**					**Exam Marks**			**Credits**
				L	**T**	**P**	**TW + SL**	**Total**	**CIE**	**SEE**	**Total**	
1	HSMC	25EE501	Industrial Management	0	28	0	02	30	50	50	100	1
2	IPCC	25EE502	Linear Control Systems	42	0	28	50	120	50	50	100	4
3	PCC	25EE503	Electromagnetic Fields	42	0	0	48	90	50	50	100	3
4	PCC	25EE504	Power Electronics	42	0	0	48	90	50	50	100	3
5	PEC	25EE51X	Professional Elective Course - I	42	0	0	48	90	50	50	100	3
6	BSC	25RIP	Research Methodology and IPR	42	0	0	48	90	50	50	100	3
7	PCCL	25EE505	DC and Synchronous Machines Laboratory	0	0	28	02	30	50	50	100	1
8	SDC	25HBP	Hackathon-Based Project	0	0	0	30	30	50	50	100	1
9	AEC	25PT3	Placement Training III	14	0	0	16	30	50	50	100	1
Total							**292**	**600**	**450**	**450**	**900**	**20**

PROFESSIONAL ELECTIVE COURSE - I			
25EE511	Fundamentals of Electric Vehicles	25EE513	AI in Electrical Engineering
25EE512	Programmable Logic Controllers	25EE514	Cybersecurity in Power Systems

Note:

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L: Lecture; T: Tutorial; P: Practical/Drawing; TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.);

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

SIXTH SEMESTER											
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW + SL	Total	CIE	SEE	Total	
1	PCC	25EE601	Electrical Machine Design	42	0	0	48	90	50	50	100	3
2	PCC	25EE602	Power System Analysis and Stability	42	0	0	48	90	50	50	100	3
3	PCC	25EE603	High Voltage Engineering	42	0	0	48	90	50	50	100	3
4	PEC	25EE62X	Professional Elective Course - II	42	0	0	48	90	50	50	100	3
5	OEC	25OEX6X	Open Elective Course - I	42	0	0	48	90	50	50	100	3
6	PI	25PRJ1	Capstone Project – Phase I	0	0	0	90	90	50	50	100	3
7	PCCL	25EE604	Power Electronics Laboratory	0	0	28	02	30	50	50	100	1
8	PCCL	25EE605	Relay and High Voltage Laboratory	0	0	28	02	30	50	50	100	1
9	AEC	25PT4	Placement Training IV	0	0	28	02	30	50	50	100	1
10	NCMC	25UHV	Universal Human Values (VTU Online Course)	14	0	0	16	30	100	-	100	Audit
Total							**352**	**660**	**550**	**450**	**1000**	**21**

PROFESSIONAL ELECTIVE COURSE - II			
25EE621	Industrial Drives and Applications	25EE623	Embedded Systems
25EE622	Renewable Energy Systems	25EE624	Energy Auditing and Demand-Side Management
OPEN ELECTIVE COURSE - I			
25OEEE61	Alternate Energy Sources	25OEEE62	Utilization of Electric Power
25OEEE63	Basics of Power Electronics	25OEEE64	Electric Vehicle Technology

Note:

This scheme is as per the new National Credit Framework, which accounts for 30 hours of learning as equivalent to 1 credit

L: Lecture; T: Tutorial; P: Practical/Drawing; TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.);

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

SEVENTH SEMESTER												
Sl. No	Course Category	Course Code	Course Title	Teaching Hours per Semester					Exam Marks			Credits
				L	T	P	TW + SL	Total	CIE	SEE	Total	
1	IPCC	25EE701	Computer Methods in Power Systems	42	0	28	50	120	50	50	100	4
2	PCC	25EE702	Switchgear Protection and Distribution	42	0	0	48	90	50	50	100	3
3	PCC	25EE703	Modern Control Theory	42	0	0	48	90	50	50	100	3
4	PEC	25EE73X	Professional Elective Course - III	42	0	0	48	90	50	50	100	3
5	PEC	25EE74X	Professional Elective Course - IV	42	0	0	48	90	50	50	100	3
7	PI	25PRJ2	Capstone Project – Phase II	0	0	0	210	210	100	100	200	7
8	NCMC	25IKS	Indian Knowledge System (VTU Online Course)	14	0	0	16	30	100	-	100	Audit
Total							**468**	**720**	**450**	**350**	**800**	**23**

PROFESSIONAL ELECTIVE COURSE - III			
25EE731	Flexible AC Transmission Systems	25EE733	Smart Grid Technologies
25EE732	Power System Operation and Control	25EE734	Battery Energy Storage Systems
PROFESSIONAL ELECTIVE COURSE - IV			
25EE741	Electrical Power Quality	25EE743	Solar Power Conversion Systems
25EE742	Testing and Commissioning of Electrical Equipment	25EE744	VLSI Design

Note:
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L: Lecture; T: Tutorial; P: Practical/Drawing; TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.);
SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

EIGHTH SEMESTER												
Sl. No	**Course Category**	**Course Code**	**Course Title**	**Teaching Hours per Semester**					**Exam Marks**			**Credits**
				L	**T**	**P**	**TW + SL**	**Total**	**CIE**	**SEE**	**Total**	
1	PEC	25SW01	Professional Elective Course - V (NPTEL Online Course)	0	0	0	90	90	50	50	100	3
2	OEC	25SW02	Open Elective Course - II (NPTEL Online course)	0	0	0	90	90	50	50	100	3
3	PI	25INT	Internship (15 weeks)	0	0	0	0	360	100	100	200	9
Total								**540**	200	200	400	**15**

Community/Societal Project

A community is a social unit or group of people sharing socially significant characteristics, such as place, set of norms, culture, religion, values, customs or identity. A community project involves addressing issues or needs within such a community or a network of entities working towards a common purpose. These projects may cover a wide range of areas, including welfare, sustainability, technology integration, and social development. Examples include establishing and maintaining an orphanage, implementing solar power generation and its maintenance, or developing environmental improvement solutions, etc. A community project is an experiential learning activity that encourages students to identify, analyze, and address real-life problems of the community using engineering knowledge. It aims to promote social responsibility and civic engagement, interdisciplinary thinking and collaboration and practical application of theoretical concepts, thereby enabling students to contribute meaningfully to community welfare and sustainable development. Students can take up projects individually or in a group not exceeding 4 students.

Environmental Science Project

The Environmental Science Project is an applied learning component designed to develop students' awareness, understanding, and responsibility toward the environment. It provides an opportunity to study real-world environmental issues and apply scientific and engineering principles to design feasible and sustainable solutions. The topics under environment include, but not limited to, climate change, biodiversity, air and water pollution, land use, excess use of natural resources, earthquakes, rise in the earth's temperature, power generation, soil erosion, environment issues related programmme, etc. The project involves problem identification, field surveys, case studies, data collection, environmental audits, analysis, and proposal of remedial or preventive measures aimed at improving biodiversity, air quality, and thermal comfort, etc. Students can take up projects individually or in a group not exceeding 4 students. Students can opt for Interdisciplinary Project based on their interest.

Hackathon Based Project

The term hackathon is derived from the combination of hack (referring to clever problem-solving, not illegal activity) and marathon, which denotes an arduous (i.e., difficult) intellectual task requiring sustained effort, endurance, and mental resilience. The meaning of a hackathon varies depending on the specific context and intent. In an academic context, a hackathon can be considered to involve several concepts, ranging from resourceful, unconventional approaches to problem-solving. Though a hackathon is an event, typically lasting for a few days to address a specific challenge, for academic purposes, it is conducted as a noncompetitive semester-long activity. The evaluation is done as and when the project is completed, by a panel of industry experts. The hackathons not only help participants develop skills like problem-solving, critical thinking, creativity, teamwork, communication and time management, but also foster indigenous technology development, promote innovation and entrepreneurship, and contribute to non formal learning and skill enhancement. Students can take up a hackathon project individually or in a group of not exceeding 4 students. The respective BoS will announce the problem statements in the beginning of the 5th semester. The topic selected can be discipline specific, interdepartmental, industrial, social (refers to immediate human relations, interactions, and individual behavior within a community), societal (describes larger, general issues, institutions, and structures that define society as a whole), environmental, health, financial, or innovative in nature, leading to development of a working prototype, application, or product. Hackathon projects are aligned with the principles of Outcome-Based Education (OBE) and support the objectives of innovation, skill development, and experiential learning in engineering education. Projects shall be evaluated by industry experts, based on creativity, problem-solving approach, teamwork, and possible implementation, as far as possible, as and when the project is completed.

Capstone Project

The Capstone project is a comprehensive, year-long project carried out in two phases during 6th and 7th semesters of the undergraduate engineering/technology program. It integrates knowledge and skills acquired from multiple courses and disciplines to address a complex, real-world problem. This project provides students with an opportunity to apply scientific principles, engineering methodologies, and technological tools to conceive, design, implement and evaluate an engineering solution. It serves as a culminating academic experience to demonstrate program outcomes, including problem-solving ability, teamwork, communication skills, and practical application of engineering principles. Students can take up projects individually or in a group not exceeding 4 students. The group may have students from the same discipline and drawn from different disciplines.

Types of Capstone Projects: Capstone projects undertaken for one year may fall into one or more of the following categories:

a) Research-Oriented Projects
   - Focus on investigating new concepts, theories, or technologies.
   - Aim to generate new knowledge or contribute to academic research.

b) Experimental/Analytical Projects
   - Based on laboratory or field experiments to validate a hypothesis or study a phenomenon.
   - Including detailed data collection, analysis, and interpretation.

c) Simulation/Modelling Projects
   - Use computational tools to model, simulate, and predict system behavior.
   - Reduce the need for physical prototyping in the initial stages.

d) Industrial/Industry-Sponsored Projects
   - Carried out in collaboration with an industry partner, address real-world engineering problems faced by the organization.

e) Interdisciplinary/Multidisciplinary Projects
   - Combine knowledge and techniques from multiple engineering domains or other fields such as management,

III SEMESTER

Course Title	MATHEMATICS -III FOR ELECTRICAL AND ELECTRONICS ENGINEERING		
Course Code	25MA301	(L-T-P) C	(3-0-0) 3
CIE	50	Hours/Week	4
SEE	50	Total Hours	42L + 48ABL = 90

Course Objective: To introduce linear algebra and transform calculus which may be employed as tools in solving engineering application problems.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Apply mathematical concepts to analyze and solve engineering problems related to linear algebra.	1,2	-
2	Use Fourier series techniques for solving engineering problems related to Continuous and Periodic systems.	1,2	-
3	Analyze and obtain solution of engineering problems related to Continuous and discrete systems using Fourier transform and Z-transforms.	1,2	-
4	Apply analytical and computational techniques to solve real time engineering problems.	1,2,3	-

MODULE - 1 — 10 Hrs.

Linear Algebra: Importance of Matrices, Elementary row transformation, Rank of a matrix. Consistency of system of equations - Gauss elimination method, Gauss – Seidel iterative method.

Eigen values: Importance of Eigen values and Eigen vectors, Rayleigh power method to find the highest Eigen value. Diagonalization and powers of 3X3 matrices when Eigen values are already given.

Applications: circuit flow problem, Smart Grid Systems using Eigen Values.

Self Study -Traffic flow problem, To find the suitable combination of food stuff so as to get the desired nutrients as prescribed by a dietician.

MODULE - 2 — 10 Hrs

Linear transformation : Introduction, Matrix representation of transformation ,image of a matrix under the transformation - matrix of rotation, reflection, translation for a given point.

Orthogonality: Dot product, definition, orthogonal projection, orthogonal bases, Gram Schmidt process, least squares method, singular value decomposition (SVD).

Application: vector control in electric motor devises, antenna array face symmetry.

Self-Study- Matrix factorization - LU decomposition , QR decomposition.

MODULE - 3 — 10 Hrs.

Fourier Series: Importance, Concepts, **Periodic** function, Dirichlet's condition. Fourier series expansion of functions and their graphical representation, Fourier series of Odd & Even functions, Half range series method, Practical harmonic analysis.

Application of Fourier series -To represent the signal (wave form) in terms of Fourier series, Fourier series representation for the excitation described by the wave form.

Self-Study- Basic idea of converting signals from time domain to frequency domain, Difference between periodic and non-periodic signals.

MODULE - 4 — 12 Hrs

Fourier Transform: Introduction, Evaluation of Complex Fourier transform, Properties of Fourier transform (Linearity, Change of Scale, Shifting),Fourier sine & Fourier cosine transforms.

Inverse Fourier Transform: Inverse Fourier transforms, Inverse Fourier cosine and sine transforms.

Z-Transforms: Introduction, Definition of Z-transforms , Z-transforms for some standard functions, Properties- Linearity property, Damping rule, Shifting rule.

Inverse Z-transforms- Partial fraction method, Solution of Difference equations using Z-Transforms.

Application- Deflection of a loaded string.

Self-Study-Initial value theorem, Final value theorem– Problems, Fast Fourier transforms.

NOTE:

Note– Theorems and properties without proof. Applicable to all the modules. Self-study is not included in SEE.

Prescribed Text Books:

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1.	Linear Algebra and its Applications	David C. Lay, Steven R. Layand J.J. Mc Donald	5 ISBN-10:9350517698	Pearson Education Ltd	2015

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Advanced Engineering Mathematics	E.Kreyszig	10	Wiley	2015
2.	Linear Algebra and its Applications	Gilbert Strang	4	Cenage publications	2014

EBooks and online course materials:

1. https://www.geneseo.edu/~aguilar/public/assets/courses/233/main_notes.pdf

Online Courses and Video Lectures:

1. https://www.coursera.org/learn/introduction-to-linear-algebra
2. https://www.coursera.org/specializations/linear-algebra-elementary-to-advanced
3. https://archive.nptel.ac.in/courses/111/106/111106135/

Teaching -Learning– Evaluation Scheme:

Sl.No	Teaching and Learning Method	No.of Hours/ Week	No.of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Student Study Hours – Self Learning	1	14	14
3	Activity Based Learning (ABL1 & ABL2)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours/Semester				**90**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted Activity 1: Writing Assignment with Problems on concerned to real world applications	10
	Activity 2: Problem Solving Assignment	10
Total		**50**

ABL1(14Hours):Activity1details		Hours
Writing Assignment with Problems on concerned to real world applications.	Submission of the final assignment report and evaluation.(Questions of Blooms level L3andHigher)	14
Total		**14**
ABL2(13Hours):Activity2 details		
Problem Solving Assignment	Understand the input data requirements	1
	Formulate the methodology	4
	Design the solution	4
	Solving the problem and submission	4
Total		**13**

Evaluation of Learning Process (7Hours)

Type of Evaluation	Hours
Test(1,2and 3)	3
Activity(1and 2)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix

Course Outcomes	Program Outcomes[POs]												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2											
CO2	3	2											
CO3	3	2											
CO4	3	2	2										

Course Title	ANALOG ELECTRONIC CIRCUITS		
Course Code	25EE302	(L-T-P) C	(3-0-2) 4
CIE	50	Hours/Week	5
SEE	50	Total Hours	42L + 28P+50ABL = 120

Course Objective: To analyze analog electronic circuits for different applications.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Explain the basic concepts of analog electronic devices as an amplifier and switch.	1	1
2	Analyze the performance of analog electronic devices.	1, 2	1
3	Apply the knowledge of analog electronic devices to realize oscillator circuits.	1, 2	1
4	Build analog electronic circuits based on operational amplifiers.	1, 2	1

MODULE - 1 — **11 Hrs.**

Semiconductor Diodes: Introduction to diodes, Bridge rectifier, Clippers-Parallel clippers; Clampers- positive clamping and negative clamping without bias; Zener Diode-working and characteristics of Zener diode.

Bipolar Junction Transistors: Introduction to BJT, Biasing of transistor and limitations of biasing, biasing transistor as an amplifier; Self bias circuit, voltage divider bias circuit, small signal analysis of self and Voltage divider bias circuit for CE configuration (Exact analysis only) using hybrid model, RC coupled amplifier and its frequency response.

SLC: Zener diode as a voltage regulator (regulation at supply side and regulation at load side), Emitter follower bias circuit and its small signal analysis using hybrid model.

MODULE - 2 — **11 Hrs.**

JFET: Construction, Operation and Characteristics of JFETs, biasing of FET using Self-bias and Voltage divider bias circuits for CS configuration, FET small signal model, Small signal analysis of voltage divider bias circuits for CS configurations, JFET working as a switch.

MOSFET: Types of MOSFET, Construction, Operation and Characteristics of Enhancement type MOSFET. Biasing of Enhancement type MOSFET using voltage divider bias circuit, Small signal model for enhancement type MOSFET, MOSFET working as a switch.

SLC: Biasing JFET in CD configuration, operation of Depletion type MOSFET

MODULE - 3 — **10 Hrs.**

Feedback Amplifiers: Feedback concept and feedback connection types.

Oscillators: Principles of Oscillators, Bark Hausen's criterion, Phase shift oscillator- conditions for sustained oscillations, frequency of oscillation; Wien-bridge oscillator, Principles of tuned oscillator circuits- Colpitts Oscillator and Hartley Oscillator.

SLC: Multistage amplifiers, Different feedback circuits working principle, Darlington amplifier.

MODULE - 4 — **10 Hrs**

Operational Amplifiers: Introduction, Inverting Amplifier, Non-inverting Amplifier, Voltage follower, Summing Amplifier, Difference Amplifier, Integrator and Differentiator, zero crossing detector,.

SLC: Precision rectifiers using OPAMPs, Schmitt trigger circuits.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Electronic Devices and Circuit Theory	Robert L. Boylestad and Louis Nashelsky	11th	Pearson	2013
2	Electronic Devices and Circuits	David A Bell	5th	Oxford University Press	2008

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year

1	Principles of Electronics	V. K. Mehta and Rohit Mehta	11th	S. Chand & Co	2020
2	Integrated Electronics: Analog and Digital Circuits and Systems	Jacob Millman and Christos C. Halkias	2nd	TMH	1972
3	Electronic Circuits	Sudhaker Samuel, U. B. Mahadevaswamy & V.Nattarasu	2th	Sanguine Technical Publishers	2006

E Books and online course materials:

1. https://onlinecourses.nptel.ac.in/noc20_ee45/preview?utm_source=chatgpt.com
2. https://www.iitg.ac.in/apvajpeyi/ph218/Lec-1.pdf?utm_source=chatgpt.com
3. https://content.kopykitab.com/ebooks/2016/06/7572/sample/sample_7572.pdf?utm_source=chatgpt.com

Online Courses and Video Lectures:

1. https://archive.nptel.ac.in/courses/108/105/108105158/
2. https://nptel.ac.in/courses/108106188

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab component	2	14	28
3	Student Study Hours – Self Learning	1	14	14
4	Evaluation of Learning Process	-	-	07
5	Activity Based Learning **(ABL)**	-	-	20 + 9 = 29
Total Learning Hours / Semester				**120**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Writing Record – 10 marks Laboratory CIE -10 marks	20
Total		**50**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Activity 1 and 2	01
Semester End Exam	03
Total	**07**

Laboratory Components	**28 Hrs**

1. Testing of Bridge rectifier with and without filter.
2. Testing of Diode parallel Clipping circuits.
3. Testing of Diode clamping circuits.
4. Testing of zener diode as voltage regulator.
5. Testing of a single stage BJT based RC coupled amplifier and determination of frequency response, input and output characteristics.
6. Testing of RC phase shift oscillator and determination of frequency of oscillation.
7. Testing of FET/MOSFET as a switch to on/off the lamp load.
8. Frequency response of Inverting Amplifier using Op-Amp
9. Frequency response of Non-inverting Amplifier and Voltage follower using op-amp 741-IC.
10. Testing of inverting and non-inverting Zero-crossing detector.

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3											2	
CO2	3	3										2	
CO3	3	3										2	
CO4	3	2										2	

Course Title	ELECTRICAL NETWORK ANALYSIS		
Course Code	25EE303	(L-T-P) C	(3-2-0) 4
CIE	50	Hours/Week	5
SEE	50	Total Hours	42L + 28T+50ABL = 120

Course Objective: To analyze electrical networks using various techniques.

Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1	Model DC and AC network using basic laws and theorems	1, 2	1
2	Analyze three-phase circuits and resonant circuits under steady state condition.	1, 2, 3	1
3	Solve network to assess initial and final conditions in networks	1, 2	1
4	Analyze electrical networks using Laplace Transforms and two port network.	1, 2, 3	1

MODULE-1 **11 Hrs**

Circuit Analysis: Active and Passive elements, Linear and Non-linear elements, Ideal and Practical Sources, Controlled Sources, Mesh analysis (loop analysis) and Node analysis with linearly dependent and independent sources for dc and ac networks, Source transformation techniques.

SLC: Coupled circuit and Mesh analysis of coupled circuits.

MODULE-2 **11 Hrs**

Network Theorems: Superposition theorem, Thevenin's theorem, Maximum power transfer theorem, Millman's theorem for dc and ac circuits.

Resonant circuits: Series resonance, quality factor, frequency response, half power frequencies, bandwidth, selectivity, frequency at which V_C and V_L is maximum (No derivation), parallel resonance, R-L -C, RL-C and RL-RC circuits.

Three-phase circuits: Types of three phases, voltage, currents and power in star and delta connections. Analysis of balanced and unbalanced star with both 3 – wire as well as 4 – wire and delta connected loads.

SLC: Norton's theorem.

MODULE-3 **10 Hrs**

Initial conditions: Integro-differential equations for networks, behaviour of R, L, and C at the instant of switching and at final conditions, initial and final conditions in networks.

Laplace Transforms for waveform synthesis: Waveform synthesis of periodic and aperiodic signals gate function.

SLC: Synthesis of wave using gate function

MODULE-4 **10 Hrs**

Laplace Transforms for network analysis: Transient response and Steady state response, Solution using classical method for RLC network, Network elements in frequency domain , Concept of transformed impedance, analysis of circuits by using transformed network, initial and final value theorems and their applications to networks, transfer functions, convolution theorem.

Two Port Networks: Z-parameters, Y-parameters, ABCD-parameters, h-parameters, relationship among Z and Y parameters. Calculation of these parameters for resistive networks.

SLC: Concept of poles and zeros.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Electric Circuits	Charles K. Alexander and Mathew N.O. Sadiku	4th	McGraw-Hill	2009
2	Network Analysis	Van Valkenburg	6th	Pearson education	2006

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Engineering Circuit Analysis	Hayt, Kemmerly and Durbin	8th	McGraw-Hill	2007
2	Networks and Systems	Roy Choudhury	2nd	New age Publication	2005
3	Network Theory: Analysis and Synthesis	Smarajit Ghosh	9th	PHI	2005

E Books and online course materials:

1. https://courses.minia.edu.eg/Attach/9850Fundamentals%20of%20Electric%20Circuits%20(Alexander%20and%20Sadiku),%204th%20Edition.pdf
2. https://ia600805.us.archive.org/8/items/M.E.VanValkenburgNetworkAnalysis.6PrenticeHallInc1959/M.E.%20Van%20Valkenburg%20-%20Network%20Analysis.%206- Prentice%20Hall%2C%20Inc%20%281959%29.pdf
3. https://uodiyala.edu.iq/uploads/PDF%20ELIBRARY%20UODIYALA/EL96/Hayt%20Engineering%20Circuit%20Analysis%208th%20txtbk.pdf

Online Courses and Video Lectures:

1. https://nptel.ac.in/courses/
2. https://www.udemy.com/course/full-course-circuit-analysis/?srsltid=AfmBOorUsGpqXV3s1CAAPDC9u5fznH-uFizDdtvyp4yqv5vFdTyjXvGo&couponCode=CP130525

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Tutorial	2	14	28
3	Student Study Hours – Self Learning	1	14	14
4	Evaluation of Learning Process	-	-	07
5	Activity Based Learning **(ABL)**	-	-	15+14=29
Total Learning Hours / Semester				**120**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted Activity 1: Simulation of electrical circuits	10
	Activity 2: Mini Project: RLC circuit behaviour and resonance for radio tuning	10
Total		**50**

Activity Based Learning (29 Hours)

ABL 1 : Simulation of electrical circuits (15 Hrs)		
Simulation-Based Learning	Verification of Superposition theorem	2
	Verification of Thevenin's theorem	2
	Verification of Maximum power transfer theorem	2
	Simulation of Unbalanced Star-Connected Loads in 3-Phase system	2
	Simulation of Unbalanced Delta-Connected Loads in 3-Phase system	2
	Generation of waveforms using standard signals.	1
	Finding the response of given network	2
	Submission of the report	2
ABL1: Total		**15**
ABL 2 : Mini Project: RLC circuit behaviour and resonance for radio tuning (14 Hrs)		
Project Based Learning	Research on radio tuning circuits (basic LC filter concept)	1
	Circuit design with RLC components	2
	Simulation of resonance curve (frequency vs current)	2
	Quality factor and bandwidth calculation	1
	Study transient behavior during switching	2
	Changing component values to tune frequency (e.g., FM 100 MHz)	2
	Filter performance for desired frequency range	2
	Submission of the report	2
ABL2: Total		**14**
ABL1 + ABL2: Total		**29**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Activity 1 and 2	01
Semester End Exam	03
Total	**07**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	3	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO4	3	3	2	-	-	-	-	-	-	-	-	3	-

Course Title	DIGITAL ELECTRONIC CIRCUITS		
Course Code	25EE304	(L-T-P) C	(3-0-0) 3
CIE	50	Hours/Week	3
SEE	50	Total Hours	42L + 48ABL = 90

Course Objective: To apply logic design methods for the analysis of digital logic circuits.

Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
CO1	Apply laws based on Boolean algebra for the realization of logic networks using basic and universal gates.	1,2,5	1
CO2	Formulate Combinational Logic Networks involving MSI and LSI components.	1,2,3,5	1
CO3	Develop logic networks for flip-flops using gates.	1,2,5	1
CO4	Design Sequential circuits using memory elements and Mealy-Moore models.	1,2,3	1

MODULE-1	12 Hrs

Principles of Combinational Logic: Introduction to fundamentals of Boolean algebra, generation of Boolean expressions from truth tables, canonical forms – SoP, PoS, basic gates, universal gates, and combinational networks, definition of combinational logic, Realization of a logical function using only NAND and NOR gates. Karnaugh maps-3,4,5 variables, Implicants, Prime Implicants and Essential Prime Implicants, Incompletely specified functions (Don‘t care terms), Simplifying Max term (PoS terms) equations, Quine-McCluskey minimization technique, Map- Entered Variables.

SLC*:* Quine-McCluskey using don’t care terms

MODULE-2	10 Hrs

Logic Design with MSI Components: Binary adders and subtractors. Look ahead adder. Decimal adders. Comparators. Decoders. Logic design using decoders. Encoders. Multiplexers. Logic design with multiplexers. Programmable Logic Devices-Programmable Logic Devices (PLD). PLD notation; programmable read-only memories (PROMS). Programmable Logic Arrays (PLAS). Programmable Array Logic (PAL) devices.

SLC: Field Programmable Gate Array (FPGA).

MODULE-3	10 Hrs

Flip-flops and applications: S-R latch and Gated S-R latch. Gated D latch. Pulse triggered master-slave S-R flip flop. The master-slave J-K flip-flop. Edge-triggered flip-flop; Positive edge-triggered D flip-flop; Negative edge-triggered D flip-flops. Characteristic equations of flip-flops. Registers. Binary ripple counters. Synchronous binary counters. Counters based on shift registers.

SLC: Ring and Johnson Counters

MODULE-4	10 Hrs

Sequential Circuit Design: Design of synchronous counters using clocked J-K flip-flops. Design of synchronous counter using clocked D, T or S-R flip-flops. Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, counter design.

SLC: Applications of Mealy and Moore models

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Digital Principles and Design	Donald D. Givone	1st	Tata Mc-Graw Hill	2002
2	Digital Logic Applications and Design	John M Yarbrough	1st	Thomson Learning	2001

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Logi Design – A Simplified Approach	R. D. Sudhakar Samuel	1st	Sanguine Technical Publishers	2005
2	Digital Design	M. Morris Mano ,Michael D. Ciletti	6th	Pearson Education	2018

Online Courses and Video Lectures:

1. https://onlinecourses.nptel.ac.in/noc25_ee20/preview
2. https://onlinecourses.nptel.ac.in/noc25_ee24/preview
3. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Student Study Hours – Self Learning	1	14	14
3	Evaluation of Learning Process	-	-	07
4	Activity Based Learning **(ABL)**	-	-	14+13=27
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted Activity 1: Lab based learning	10
	Activity 2: Lab based learning	10
Total		**50**

Activity Based Learning (27 Hours)

ABL 1: Lab based learning (20 Hrs)		**Hours**
Simulation of Combinational Circuits	Realization of combinational circuit for given minterms using basic gates.	02
	Design and simulation of combinational circuit for given maxterms.	01
	Simulation of adders, subtractors	01
	Simulation of decoders	02
	Simulation of encoders	02
	Simulation of multiplexers	02
	Simulation of minterms using PROMs/PLAs	02
	Report Writing	02
	Presentation	02
ABL1: Total		**14**
ABL 2: Lab based learning (07 Hrs)		
Implementation of digital circuit	Digital circuit implementation on breadboard	03
	Report Writing	05
	Demonstration	05

ABL2: Total	**13**
ABL1 + ABL2: Total	**27**

Evaluation of Learning Process (07 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Activity (1 and 2)	01
Semester End Exam	03
Total	**07**

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	-		2							2	
CO2	2	3	2		2							2	
CO3	3	3	-		2							2	
CO4	2	3	3		-							2	

Course Title	TRANSFORMER AND INDUCTION MACHINES		
Course Code	25EE305	(L-T-P) C	(3-0-0) 3
CIE	50	Hours/Week	3
SEE	50	Total Hours	42L + 48ABL = 90

Course Objective: To analyze the performance of Transformers and Induction Motors.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Explain the principle operation of transformers and Induction motors.	1	1
2	Develop equivalent circuits of transformers and Induction motors.	1,2	1
3	Test the transformer to know their performance.	1,2,	1
4	Apply the knowledge of Induction motor to find their performance.	1,2	1

MODULE - 1	11 Hrs.

Transformers: Construction and Practical considerations of 1phase and 3 phase core and shell type transformers, Principle of transformer action for voltage transformation, Ideal and practical transformers, EMF equation, Transformation ratio, Transformer operation under no load and load condition, Vector diagrams, Exact and approximate equivalent circuit, voltage regulation, losses, power efficiency and All-day efficiency.
SLC: Auto-transformer: Construction, saving of copper, Advantages/disadvantages, Methods of cooling

MODULE - 2	10 Hrs.

OC-SC tests - Predetermination of efficiency and regulation, Polarity test, Sumpner's test, Parallel operation– need, conditions to be satisfied and load sharing. Choice of connection, all types of 3 phase transformer connection including open delta.
SLC: Special transformers and their applications.

MODULE - 3	11 Hrs.

Induction motors: Basic concepts, Construction, Concept of rotating magnetic field, Operating principle, Classification – 3-phase, Squirrel cage, Slip ring. Phasor diagram of Induction motor under no load and load, equivalent circuit, losses and efficiency, performance evaluation (HP, Torque, efficiency, current and power factor).
SLC: Construction and working principle of various types of single-phase induction motors.

MODULE - 4	10 Hrs

Torque-slip characteristics of motoring, Generating & Braking, Induction generator, No load and blocked rotor tests, Circle diagram and performance evaluation, Necessity of starters, DOL, Star -Delta starter, Auto-transformer starting, Rotor resistance starting, Speed control: voltage, frequency and rotor resistance variation.
SLC: Applications of three phase and single-phase induction motors

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Electrical Machinery	P. S. Bimbhra	1st	Khanna	2021
2	Electrical Machines	Nagarath and Kothari	5th	Tata McGraw Hill	1985

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Electrical Machines	V. K.Mehta and Rohit Mehta	2nd	S. Chand & Co	2002
2	Electrical Machines	Ashfaq Husain	2nd	Dhanapathrai& Co	2000
3	Electric Machinery	A. E. Fitzgerald	4th	McGraw-Hill Higher Education	2003
4	Theory of Alternating Current Machines	S. Langsdorf	2nd	Tata McGraw Hill	1993

E Books and online course materials:

1. https://www.scribd.com/doc/245014778/transformers-and-Induction-Machines

Online Courses and Video Lectures:

1. https://www.youtube.com/watch?v=EI0GJo00_oY
2. https://lectures.pi2.in/course/transformer-induction-motors-kiit/?v=dea99b4facad

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Student Study Hours – Self Learning	1	14	14
3	Evaluation of Learning Process	-	-	07
4	Activity Based Learning **(ABL)**	-	-	14+13=27
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted Activity 1: Industrial Visit	10
	Activity 2: Seminar	10
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 : Industrial Visit (14 Hrs)		
Industrial visit / substation visit	Identify different types transformers and Induction motors	02
	Understanding the Features of above machines	04
	Writing the layout diagram	02
	Understand the working principle of the transformer / Induction machine	04
	Submission of the report	02
ABL 1: Total		**14**
ABL 2 : Seminar (13 Hrs)		
Seminar on different parts of transformers and Induction machines (Using you-tube videos)	Literature review	04
	Report writing	04
	Presentation, demonstration, viva-voce	05
ABL 2: Total		**13**
ABL1 + ABL2: Total		**27**

Evaluation of Learning Process (07 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Quiz (1 and 2) (optional)	01
Semester End Exam	03
Total	**07**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3											3	
CO2	3	2										3	
CO3	2	3										2	
CO4	1	3										1	

Course Title	TRANSFORMER AND INDUCTION MACHINES LABORATORY		
Course Code	25EE306	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To test and operate the transformers and induction machines.

Course Outcomes: At the end of course, students will be able to:

#	Course outcomes	Mapping to PO's	Mapping to PSO's
1	Test transformer and Induction motor to know the performance	1, 2, 4, 5, 7, 8, 11	1, 2
2	Develop skills to operate and control transformer and Induction motor	1, 3, 5, 6, 7, 8, 11	1, 2
3	Illustrate record writing skills, communication skills with upholding electrical ethical values in electrical engineering	7, 8, 9, 10	1

PART A

1. SC & OC test 1-phase transformer & predetermination of efficiency & regulation for different loads & PFs; verification by direct loading for UPF.
2. Sumpner's test.
3. Polarity test on 1-phase transformer.
4. Parallel operation of two dissimilar 1-phase transformers.
5. Connection of three 1-phase transformers in star-delta and determination of efficiency & regulations for balanced direct loading (UPF).
6. Load test on 3-phase Induction motor – performance evaluation (Torque-speed, BHP-efficiency, BHP-PF, slip-BHP).
7. No load and Blocked rotor test on three-phase slip ring IM: Circle Diagram of 3 phase Induction Motor-performance evaluation.
8. Determination of equivalent circuit parameters of 1- phase induction motor-performance evaluation.
9. Speed control of 3-phase Induction motor by Stator voltage control.
10. Load test on 1-phase Induction motor.

PART B

MATLAB Simulation based Experiments

1. Single-phase transformer no-load test. Determine core loss, no-load current, and power factor.
2. Single-phase transformer short-circuit test. Calculate equivalent resistance, reactance, and copper losses
3. Parallel operation of two transformers. Study load sharing and circulating currents.
4. Load characteristics of a single-phase transformer. Analyze voltage, current, and efficiency with varying loads.
5. No-load test of a three-phase induction motor. Determine magnetizing current and no-load losses.
6. Blocked rotor test. Determine equivalent circuit parameters.
7. Torque-speed characteristics. Plot torque versus speed under varying loads.
8. Speed control using V/f control. Study the effect of varying supply frequency.
9. Comparative Analysis of Starting Methods (DOL vs. Star-Delta).
10. Dynamic Behavior under Load Variations. (Effect of load variation. Analyze speed, current, torque, and efficiency.)

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	3	2	-	2	2	-	-	1	3	2
CO2	3	-	2	-	2	1	2	2	-	-	1	3	2
CO3	-	-	-	-	-	-	3	2	3	1	-	1	-

ABILITY ENHANCEMENT COURSE – III

Course Title	PYTHON PROGRAMMING FOR ELECTRICAL ENGINEERING		
Course Code	25AEEE31	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To apply Python programming for solving electrical engineering problems and analysis.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Apply Python programming for electrical calculations and circuit analysis.	1, 2, 3, 4, 7, 8, 9, 11	1, 2
2	Analyze electrical circuits and machine characteristics using Python.	1, 2, 3, 4, 5, 6, 7, 8, 9, 11	1, 2
3	Develop Python programs for visualization and performance analysis of electrical systems.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	1, 2

LIST OF EXPERIMENTS

1. Basic Python Programming for Electrical Calculations
2. Verification of Ohm's Law Using Python
3. Analysis of Series Circuit Using Kirchhoff's Voltage Law (KVL)
4. Node Voltage Analysis Using Kirchhoff's Current Law (KCL)
5. Plotting of Electrical Signals Using Matplotlib
6. Real-Time Visualization of Electrical Sensor Data
7. Analysis of RLC Circuit Parameters Using Python
8. Analysis of DC Motor Characteristics Using Python
9. Calculation of Electrical Machine Efficiency and Losses Using Python
10. 3D Visualization of Voltage and Current Signals

Course Articulation Matrix

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

Course Title	ELECTRICAL MEASUREMENTS LABORATORY		
Course Code	25AEEE32	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To practice and analyze design of electric circuits using network theorems.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Demonstrate the experimental skills to measure resistance, inductance, capacitance and power	1, 4, 5, 7, 8, 11	1, 2
2	Apply bridge methods for precise measurement of electrical parameters.	1, 2, 4, 5, 7, 8, 11	1, 2
3	Verify fundamental electrical circuit laws	1, 2, 4, 5, 7, 8, 11	1, 2

LIST OF EXPERIMENTS

1. Calibration and Testing of single phase energy Meter
2. Measurement of tolerance of low resistances by Kelvin's double bridge
3. Measurement of Power Factor Using Single-Phase Wattmeter, Voltmeter and Ammeter
4. Verification of Kirchoff's laws- KCL and KVL
5. Measurement of Three-Phase Power in a Star-Connected Load Using the Two-Wattmeter Method
6. Measurement of Three-Phase Power in a Delta-Connected Load Using the Two-Wattmeter Method
7. Measurement of Resistance Using Wheatstone Bridge
8. Measurement of Inductance Using Maxwell's Inductance Bridge
9. Calibration of PMMC Voltmeter Using Potentiometer
10. Measurement of Earth Resistance

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	-	3	2	-	2	3	-	-	1	3	2
CO2	3	2	-	3	2	-	2	3	-	-	1	3	2
CO3	3	2	-	3	2	-	2	3	-	-	1	3	2

Course Title	SIMULATION OF CIRCUITS LABORATORY		
Course Code	25AEEE33	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To practice and analyze design of electric circuits using network theorems.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Analyse the basic laws, series and parallel circuits and resonance in series and parallel circuits.	1,2,5,7,8	1
2	Apply different theorems to electrical network problems	1,2,5,7,8	1
3	Practice design of electrical and electronics circuits through simulation	1,2,5,7,8	1

LIST OF EXPERIMENTS

1. Verification of KCL & KVL for multi-loop electrical circuits, with independent DC sources.
2. Verification of KCL & KVL for multi-loop electrical circuits, with dependent DC sources.
3. Verification of Thevenin's Theorem.
4. Verification of Superposition's theorem.
5. Verification of Maximum Power transfer theorem.
6. Resonance characteristics of series circuits.
7. Resonance characteristics of parallel circuits.
8. Full wave rectifier with and without filter.
9. Bridge rectifier with and without filter.
10. Verification of clipping circuits.
11. Verification of clamping circuits.
12. Verification of RC coupled amplifier.

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3			3		3	3				3	
CO2	2	3			3		3	3				2	
CO3	2	2			3		3	3				2	

Course Title	SCILAB/MATLAB FOR ELECTRICAL ENGINEERING		
Course Code	25AEEE34	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To develop practical skills for simulating and modeling of Electrical and Electronics circuits.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Demonstrate proficiency in using simulation tools to model electrical and electronic systems.	1, 4, 5, 7, 8, 11	1, 2
2	Apply fundamental circuit laws and theorems to verify the behavior of DC and AC electrical circuits.	1, 2, 4, 5, 7, 8, 11	1, 2
3	Assess the performance of various analog electronic circuits.	1, 2, 3, 4, 5, 7, 8, 11	1, 2

LIST OF EXPERIMENTS

1. Introduction to MATLAB and Simulink
2. Generation of various signals and sequences (Periodic and Aperiodic), such as unit Impulse, Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp.
3. Simulation of DC circuits using Mesh Analysis
4. Verification of Thevenin's theorem.
5. Verification of Maximum Power Transfer theorem.
6. Simulation of Half and Full wave rectifier
7. Simulation of RC coupled amplifier
8. Simulation of low pass and high pass filter
9. Simulation of inverting and non-inverting using operational amplifiers
10. Transient Analysis of RC Networks

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	2	3	-	1	1	-	-	1	2	3
CO2	3	3	-	2	2	-	1	1	-	-	1	3	2
CO3	3	3	2	2	2	-	1	1	-	-	1	3	2

Course Title	Community Project / Societal Project		
Course Code	25SCR	(L-T-P)C	(0-0-2)1
Exam	3 Hrs.	Hours/Week	2
CIE + SEE	50 marks + 50 Marks	Total Hours	30

Course Objective: Rapid urbanization, population growth, environmental concerns, energy demand, water scarcity, waste management, transportation issues and rural development challenges have created practical problems affecting communities and public welfare. This course aims to integrate technical knowledge, field exposure and societal engagement so that students identify real community issues, frame problem statements and attempt appropriate, feasible and sustainable engineering responses within the scope of a one-semester project.

Course Outcomes: At the end of the course, the student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Identify and analyze societal problems through field interaction and technical assessment.	1,2,3,4,6,9	-
2	Develop skills in project planning, field survey, data collection, implementation, documentation and reporting.	1,2,3,4,5,8,9,10	-
3	Formulate feasible engineering problem statements and solutions considering practical constraints and sustainability aspects.	1,2,3,5,6,7,10	-
4	Apply principles of environmental responsibility, ethics and societal welfare in engineering practice through community-oriented interventions.	6, 7	-
5	Exhibit multidisciplinary learning and problem-solving ability based on collected data, user feedback and baseline conditions.	2,3,4,5,8,9,11	-
6	Demonstrate teamwork and communication skills while interacting with technical and non-technical stakeholders and reflect on project impact on society.	6,8,9,10,11	-

Restrictions and professional conduct:

Community / Societal Projects shall remain **academic, socially responsible, technically focused, and politically neutra**l. Students and faculty shall maintain professionalism, ethical conduct, public respect and institutional integrity while interacting with communities, public groups, organizations and stakeholders. Students and faculty shall avoid the following during project execution:

- Association with political party activities, campaigns or propaganda.
- Participation in activities that may disturb communal harmony, public order or institutional reputation.
- Use of the project platform for personal, political, ideological or commercial promotion.
- Disrespectful, discriminatory or unethical interaction with community members or stakeholders.

Projects must also recognize constraints related to cost, resources, environment and safety, and stakeholder

behavior/cooperation/acceptance when planning and implementing activities.

SET OF PROJECT ACTIVITIES (TW/SL = 30 HOURS)

Methods for Project Identification:

Students may identify the project topic using one or more of the following methods:

- Interaction with local rural or urban stakeholders such as local leaders, corporation/municipality personnel, NGOs, panchayat representatives, etc.
- Review of issues highlighted in print and electronic media, and social networks (WhatsApp, Facebook, X, Instagram, etc.).
- After selecting a broad topic, students shall collect data, conduct a feasibility survey, estimate timelines and resources, approximate expenditure, and then define the problem statement and objectives clearly.

List of Project Topics and Engineering Outcomes:

The following structured sequence of activities is to be carried out during the semester:

Sl.No	Project Title	Measurable Engineering Outcome	Mapped POs	SDGs
1.	Rural and urban water conservation and management systems	Prepare a site-specific water-saving plan, estimate water demand–supply gap, and propose a feasible conservation intervention with quantified savings.	PO1, PO2, PO3, PO4, PO10, PO11	SDG 6, SDG 11, SDG 12
2.	Waste management and recycling	Conduct waste audit, classify waste streams, and design a segregation/recycling workflow with measurable reduction in mixed waste.	PO2, PO3, PO4, PO6, PO8, PO10	SDG 11, SDG 12, SDG 13
3.	Afforestation	Identify a degraded area, prepare plantation layout, and demonstrate survival-rate tracking and maintenance schedule for saplings.	PO2, PO3, PO4, PO6, PO7, PO11	SDG 11, SDG 13, SDG 15
4.	Biogas generation and power generation	Estimate organic waste availability, size a small biogas system, and document expected gas output or energy yield.	PO1, PO2, PO3, PO4, PO5, PO10	SDG 7, SDG 11, SDG 12
5.	DPR for solar power rural plant	Prepare a DPR with load assessment, panel sizing, cost estimate, and projected energy generation and payback.	PO1, PO2, PO3, PO4, PO5, PO10	SDG 7, SDG 9, SDG 11
6.	DPR for electrification of village/tribal community	Map unserved/underserved households, propose electrification layout, and estimate coverage, losses, and implementation cost.	PO1, PO2, PO3, PO4, PO10, PO11	SDG 7, SDG 9, SDG 10

7.	DPR for rural drainage system	Survey drainage bottlenecks, develop a drainage layout, and estimate runoff handling capacity and flood-risk reduction.	PO1, PO2, PO3, PO4, PO6, PO10	SDG 6, SDG 9, SDG 11
8.	Sustainability and environmental health projects	Assess local environmental health issues and propose interventions with measurable improvement in hygiene, safety, or resource use.	PO2, PO3, PO4, PO6, PO7, PO8	SDG 3, SDG 6, SDG 11, SDG 12
9.	Plastic free campaigns	Measure plastic usage before and after awareness intervention and report percentage reduction or behavioural change.	PO2, PO3, PO6, PO7, PO8, PO10	SDG 11, SDG 12, SDG 13
10.	Health and nutrition awareness	Conduct baseline and post-program awareness survey and document improvement in awareness score or adoption of healthier practices.	PO2, PO6, PO7, PO8, PO9, PO10	SDG 2, SDG 3, SDG 11
11.	Societal projects involving health wellness	Identify a community health need and develop an awareness/service module with measurable participation and feedback outcomes.	PO2, PO3, PO6, PO8, PO9, PO10	SDG 3, SDG 11, SDG 17
12.	Air quality monitoring system	Collect air-quality data, compare with reference limits, and present trends along with possible mitigation suggestions.	PO2, PO3, PO4, PO5, PO6, PO10	SDG 3, SDG 11, SDG 13
13.	Plastic waste reduction campaign	Track collection, segregation, and replacement actions, and quantify reduction in plastic waste generation or littering.	PO2, PO3, PO6, PO7, PO8, PO10	SDG 11, SDG 12, SDG 13
14.	Urban greening projects	Prepare greening plan, identify planting locations, and assess environmental benefits such as shade, aesthetics, or heat mitigation.	PO2, PO3, PO4, PO6, PO7, PO11	SDG 11, SDG 13, SDG 15
15.	Smart agriculture solution	Design a low-cost monitoring or irrigation support solution and estimate improvement in water use efficiency or crop support.	PO1, PO2, PO3, PO4, PO5, PO10	SDG 2, SDG 6, SDG 9
16.	Smart irrigation system	Estimate crop water requirement, propose control logic, and quantify water savings compared with conventional irrigation.	PO1, PO2, PO3, PO4, PO5, PO10	SDG 2, SDG 6, SDG 12
17.	Youth mentoring programmes	Deliver a structured mentoring activity and measure participation, engagement, and skill/awareness improvement.	PO6, PO8, PO9, PO10, PO11	SDG 4, SDG 10, SDG 17
18.	Adult education	Conduct learner-needs assessment, prepare instructional content, and measure improvement in basic literacy	PO6, PO8, PO9, PO10, PO11	SDG 4, SDG 10, SDG 17

		or numeracy indicators.		
19.	Food security initiatives / cold storage system	Estimate storage need, design a simple cold-chain concept, and document reduction in spoilage or wastage.	PO1, PO2, PO3, PO4, PO5, PO10	SDG 2, SDG 9, SDG 12
20.	Human rights awareness with legal systems	Prepare and deliver an awareness module and assess increase in legal awareness and access-to-rights understanding.	PO6, PO7, PO8, PO9, PO10	SDG 5, SDG 10, SDG 16
21.	House tax collection through digital media	Develop a simple digital workflow or awareness support and measure improvement in compliance, convenience, or response time.	PO2, PO3, PO4, PO5, PO10, PO11	SDG 9, SDG 11, SDG 16
22.	Use of application / application program	Build or demonstrate a useful community app and measure usability, adoption, or efficiency improvement.	PO1, PO3, PO4, PO5, PO9, PO10	SDG 9, SDG 11, SDG 17
23.	Creation of Panchayat library	Plan the library model, catalogue resources, and measure usage, accessibility, or participation outcomes.	PO6, PO8, PO9, PO10, PO11 SDG 4,	SDG 10, SDG 11, SDG 17

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher
1	Community Engagement and Social Innovation	Phadke, N. D.	1st	Oxford University Press, New Delhi.
2	Project-Based Learning in Engineering Education	Garg, N. R.	1st	Pearson India Education Services, Noida.
3	Service Learning and Community Projects.	Gupta, A. and P. Singh.	1st	McGraw-Hill Education (India), New Delhi.
4	Practical Guide to Community Development Projects	Wilson, G.	2nd	Routledge, London.

Reference Books:

1. NPTEL courses on Project-Based Learning and Social Innovation.
2. SWAYAM courses on community engagement and sustainability.
3. UN Sustainable Development Goals portal: https://sdgs.un.org
4. MyGov India and local civic body portals for community initiatives.
5. YouTube resources on design thinking, social innovation, and community service learning.

6. NGO and government field-action case studies related to sanitation, water, health, education, and environment.

Web links and Video Lectures (e-Resources):

1. NPTEL courses on Engineering Geology (IIT Roorkee, IIT Kharagpur).
2. NPTEL courses on Soil Mechanics and Foundation Engineering (IIT Delhi, IIT Bombay).
3. Virtual Labs – Geotechnical Engineering Virtual Lab (IIT Kanpur): https://vlab.co.in
4. Geological Survey of India (GSI) – Maps, reports, and publications: https://www.gsi.gov.in
5. YouTube channels: Civil Engineering Essentials, The Engineering Classroom (soil mechanics experiments).
6. American Society of Civil Engineers (ASCE) – Geotechnical resources and standards

Teaching-Learning Process:

Week / Phase	Teaching-Learning Activity	Faculty Role	Student Activity	Output / Evidence
1	Course introduction, objectives, ethics, conduct, and assessment briefing	Explain course scope, rules, rubrics, and expected deliverables	Understand course requirements and form teams	Team list, course plan
2	Community problem identification and topic selection	Guide topic framing and feasibility	Identify local issues through discussion and observation	Shortlisted project topic
3	Stakeholder interaction and preliminary survey	Demonstrate survey methods and stakeholder engagement	Collect initial data from community/users	Survey notes, interview record
4	Problem statement and objective formulation	Review and refine problem statement	Prepare problem statement, scope, and objectives	Approved problem statement
5	Literature/case study review and baseline analysis	Suggest relevant references and examples	Study existing solutions and compare approaches	Baseline analysis summary
6	Project planning and role assignment	Help teams organize tasks, timeline, and	Plan activities, divide roles, and	Work plan / Gantt chart

		responsibilities	prepare schedule	
7	Feasibility analysis and solution brainstorming	Check technical feasibility and practicality	Generate possible engineering solutions	Solution alternatives sheet
8	Selection of final solution and design approach	Review final concept and design logic	Finalize concept, methods, and expected outcome	Concept note / design outline
9	Data processing / calculations / sizing / mapping	Support computations and technical review	Analyze data, perform calculations, prepare maps/charts	Technical analysis sheet
10	Prototype / model / audit / DPR / app development	Monitor progress and correct technical issues	Develop the selected output	Working model / draft DPR / map / app
11	Testing, refinement, and implementation planning	Evaluate technical correctness and improvements	Test prototype or validate proposal with users	Test results / revised output
12	Field implementation / demonstration / awareness activity	Facilitate community interaction and documentation	Conduct implementation or demonstration	Photos, attendance, implementation record
13	Documentation of outcomes, feedback, and impact	Review report structure and completeness	Compile findings, stakeholder feedback, and observations	Draft report
14	Presentation preparation and viva practice	Conduct mock presentation and feedback	Prepare slides/poster and rehearse	Presentation deck
15	Final presentation, submission, and reflection	Evaluate performance using rubrics	Present project, submit report, reflect on learning	Final report, presentation, viva

Assessment structure:

A. Continuous Internal Evaluation (CIE) – 50 marks

• Students, in batches of 3–4, shall undertake at least one project (or a combination of two related activities) aiming, as far as possible, at a logical implemented or implementable outcome.

• CIE will be conducted by a departmental committee (HoD/nominee, guide and one senior faculty) using the following rubrics totaling 50 marks:

B. Semester End Examination (SEE) – 50 marks

• The SEE shall be conducted batch-wise by a committee of : one faculty from the same department and one from a different department.

CIE and SEE Rubrics

Criterion	Weight (marks)	Excellent (Full marks)	Good	Fair	Needs Improvement
Problem identification & Relevance to society/industry/community	8	Problem is clearly identified with strong evidence of societal relevance and well-defined scope.	Problem is relevant and scope is clear with adequate supporting evidence.	Problem defined but justification or evidence is weak.	Problem unclear or not relevant; little/no supporting evidence.
Formation of problem statement; Engineering approach, innovation & feasibility	10	Problem statement is precise; approach is sound, innovative and clearly feasible.	Problem statement adequate; approach feasible with minor gaps.	Problem statement partial; approach feasibility is marginal.	Problem statement missing or approach not feasible.
Interaction with stakeholders; Data collection, analysis & interpretation	8	Thorough stakeholder engagement; data collection is comprehensive; analysis is well-interpreted.	Good engagement; data analysis adequate with minor gaps.	Limited engagement; data incomplete and analysis superficial.	Little/no stakeholder contact; insufficient or no data/analysis.
Project documentation; Clarity, organization & problem-solving demonstrated	10	Documentation is complete, well-organized, analytical, and shows strong problem-solving.	Documentation complete and clear with some analytical content.	Documentation on basic with omissions; problem-solving limited.	Documentation missing/poorly organized; no clear problem-solving.
Communication & Presentation skills	6	Presentation is confident, structured, and answers queries	Presentation clear and satisfactory; responds to	Presentation acceptable but lacks clarity or confidence;	Presentation poor or absent; unable to respond.

		fully; visuals effective.	most queries.	weak responses.	
Contribution & Benefit to society (impact, sustainability)	8	Clear, demonstrable societal benefit and sustainability; realistic path to implementation.	Benefit plausible; sustainability considered with minor gaps.	Limited or unclear societal benefit; sustainability not well addressed.	No evident benefit or sustainability; project not community-oriented.

Semester III			
Yoga - I			
Course Code	25YOG1	**CIE**	100 Marks
Course Type	NCMC		
Total Hours	2 hrs/week		

Course Objectives

The objectives of this course are to:

1. Introduce students to the origin, history, philosophy, and fundamental concepts of Yoga.
2. Familiarize students with the different schools of Yoga, its aims, objectives, and the importance of prayer in Yogic practice.
3. Develop awareness of the rules, regulations, and safety precautions to be followed during Yogic practices.
4. Enable students to learn and practice Suryanamaskara and selected Yogasanas with proper techniques for improving physical and mental well-being.
5. Promote a healthy life style by encouraging regular Yogic practice, correcting misconceptions about Yoga, and fostering positive health, self-discipline, and overall wellness.

Introduction of Yoga: Yoga, its origin, history and development. Yoga, its meaning, definitions. Different schools of yoga, Aim and Objectives of yoga, **Prayer** : importance of prayer
Brief introduction of yogic practices for common man to promote positive health, **Rules and regulations**: Rules to be followed during yogic practices by practitioner
Suryanamaskara:Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar 12 count, 2rounds, Misconceptions of yoga: **Yoga its misconceptions**, Difference between yogic and non yogic practices
Different types of Asanas: Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana, Sitting 1.Padmasana, 2.Vajrasana, Standing 1.Vrikshana, 2.Trikonasana, Proneline1.Bhujangasana, 2.Shalabhasana, Supineline 1.Utthitadvipadasana, 2.Ardhahalasana

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Explain the origin, history, philosophy, objectives, and different schools of Yoga, along with its role in promoting holistic health and well-being.
2. Understand and apply the rules, regulations, and ethical practices associated with Yogic exercises, including the significance of prayer and Suryanamaskara.
3. Demonstrate the correct techniques of selected Yogasanas, such as sitting, standing, prone, and supine postures, while observing appropriate precautions.
4. Analyze the physical, mental, and therapeutic benefits of Yogic practices and distinguish between authentic Yogic practices and common misconceptions about Yoga.
5. Adopt Yoga as a regular life style practice to enhance physical fitness, mental wellness, discipline, and overall quality of life.

Suggested Learning Resources: (TextBook/ReferenceBook/Manuals):

Text books:

1. George Feuerstein: the yoga Tradition (its history, literature, philosophy and practice)
2. Sri Ananda: The complete Book of yoga Harmony of Body and Mind (Orient paper Backs: Vision Books Pvt.Ltd..1982.
3. B.K.Slyenkar: Light on the Yoga sutras of Patanjali (Haper Collins Publications India Pvt.Ltd.New Delhi.)
4. Science of Divinity and Realization of Self Vethathiri Publication,(6-11)WCSC,Erode

Reference books/Manuals:

1. Principles and Practice of Yoga in Health Care,Publisher:Handspring Publishing Limited. ISBN:9781909141209,978190914209
2. BasavaraddiIV: Yoga in School Health, MDNIY NewDelhi. 2009
3. Dr.HR.Nagendra: Yoga Research and application (Vivekanda Kendra Yoga Prakashana Bengalore)
4. Dr.Shirley Telles: Glimpses of Human Body (Vivekanda KendraYoga Prakashana Bengalore).

Web links and Video Lectures (e-Resources):

Search by topics to get the videos

Assessment Structure:

This course is having only **Continuous Internal Assessment** (CIE) marks of 100.

Weightage	**Marks**
Attendance to all the sessions	20Marks
Practical sessions on Yoga and Its Benefits	40Marks
Two Assignments	40Marks
Total Marks	100

A student shall obtain a minimum of 40% marks or 40 marks out of 100 to qualify in the course.

Semester: III						
PHYSICAL EDUCATION (SPORTS & ATHLETICS)–I						
Course Code	**:**	25PE1		**CIE**	**:**	**100 Marks**
Credits: L:T:P	**:**	0:0:1				
Total Hours	**:**	15 P				

Course Outcomes: At the end of the course, the student will be able to

1. Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
2. Familiarization of health-related Exercises, Sports for overall growth and development
3. Create a foundation for the professionals in Physical Education and Sports
4. Participate in the competition at regional/state/national/international levels.
5. Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.
6. Understand and practice of Traditional Games

Module I: Orientation **4 Hours**

A. Lifestyle
B. Health &Wellness
C. Pre-Fitness test.

Module II: General Fitness & Components of Fitness **4 Hours**

A. Warming up (Free Hand exercises)
B. Strength–Push-up/Pull-ups
C. Speed– 30Mtr Dash

Module III: Specific games (Any one to be selected by the student) **16 Hours**

1. Kabaddi–Handtouch,Toe Touch,Thigh Hold, Anklehold and Bonus.
2. Kho-Kho– Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.

Scheme and Assessment for auditing the course and Grades:

Sl.No.	Activity	Marks
1.	Participation of student in all the modules	20
2.	Quizzes/Assignment–2,eachof 20marks	40
3.	Final presentation/exhibition/Participation In competitions/practical on specific tasks assigned to the students	40
	Total	**100**

IV SEMESTER

Course Title	ELECTRIC POWER GENERATION AND TRANSMISSION		
Course Code	25EE401	(L-T-P) C	(4-0-0) 4
CIE	50	Hours/Week	4
SEE	50	Total Hours	56L + 64ABL = 120

Course Objective: To analyze Electric power Generation plants and transmission lines.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Explain the basic principles of various electric power generation plants.	1	1
2	Analyze the economic performance of power plants using system performance indices.	1,2,6	1
3	Determine inductance, capacitance, and sag of overhead transmission lines.	1,2	1
4	Analyze the performance of transmission lines using appropriate equivalent network models.	1,2,6	1

MODULE - 1 — **14 Hrs.**

Electrical Power Generation: Advantages, disadvantages and site selection for hydro power generation, Thermal power plant, Nuclear power station. **Hydro Power Generation:** Classification of hydroelectric plants, General arrangement and operation, Comparison between Kaplan and Francis turbine.
Thermal: Main parts and working, plant layout. **Nuclear Power Station:** Component of reactors, working, safety of nuclear power reactor. **Diesel Electric Station:** Diesel electric plants and component, choice and characteristics, plant layout and maintenance.
SLC: Introduction to tidal power plants and geo thermal plants.

MODULE - 2 — **14 Hrs.**

Performance analysis: Introduction, terms used in system operation: diversity factor, load factor, plant capacity factor, plant use factor, plant utilization factor, loss factor, load duration curve, energy load curve.
Power factor improvement: causes, disadvantages and methods to improve. **Tariffs:** objectives and requirements of tariff, characteristics of tariff and types of tariffs, Numerical Examples
SLC: Interconnection of power station

MODULE - 3 — **14 Hrs.**

Typical transmission, Standard voltages for Transmission, Advantages of high voltage transmission.
Overhead transmission line: Introduction to transmission tower structures and its classification. Definition of sag, sag calculation in conductors- **(a)** Suspended on level supports **(b)** Supports at different levels. Effect of wind and ice.
Line parameter - Inductance: Calculation of inductance of single phase, three phase lines with Equilateral and unsymmetrical spacing.
Line parameter - Capacitance: Capacitance-calculation for two wires and three phase Lines, capacitance calculation for two wires 3-phase lines with equilateral and Unsymmetrical spacing. Numerical Examples.
SLC: Stringing Chart

MODULE - 4 — **14 Hrs**

Power transmission lines: Short and medium lines, Introduction, Classification of overhead transmission lines, Representation of transmission lines, Terms related to performance of transmission lines, Performance analysis of short transmission lines, Medium transmission lines. Generalized circuit constants of nominal T network lines. Long Transmission Lines, Condenser method, nominal T and π representation of medium transmission lines, Representation of long transmission lines.
SLC: Generalized circuit constants of nominal π network lines.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Power System Engineering	Chakrabarti A., M.L. Soni, P.V. Gupta and .S.Bhatnagar	-	Dhanpat Rai & Co. (Pvt.) Ltd	2003

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1	Electric Power Generation Transmission and Distribution	S. N. Singh	2nd	Prentice Hall of India	2008
2	Electrical Power Systems	C. L. Wadhwa	7th	New Age International	2017
3	Principles of Power Systems	V. K. Mehta and Rohit Mehta	3rd	S Chand	2005

E Books and online course materials:

1. https://**Electric Power Generation, Transmission and Distribution.** *Author:* S. N. Singh
2. https://www.phindia.com/Books/ShoweBooks/MTMwNw/Electrical-Power-Systems

Online Courses and Video Lectures:

1. https://www.coursera.org/specializations/power-system-generation-transmission-and-protection
2. https://onlinecourses.nptel.ac.in/noc22_ee17/preview

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	4	14	56
2	Student Study Hours – Self Learning	1	14	14
3	Evaluation of Learning Process	-	-	07
4	Activity Based Learning **(ABL)**	-	-	22+21=43
Total Learning Hours / Semester				**120**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted Activity 1: Simulation based Activity	10
	Activity 2: Field Visit activity	10
Total		**50**

Activity Based Learning (43 Hours)

ABL 1 : Simulation based Activity (22 Hrs)		
Simulation based Assignments	Simulation of short transmission lines Simulation of Medium Transmission lines i) T method ii) π method Simulation of transmission line parameters	3*5=15
	Demonstration	01
	Report writing and submission	06
ABL1: Total		**22**
ABL 2 : Field Visit activity (21 Hrs)		
Generation Power plant / Substation visit	Pre Visit Procedure	02
	Visit	10
	Report preparation	05
	Presentation	02
	Quiz	02
ABL2: Total		21
ABL1 + ABL2: Total		**43**

Evaluation of Learning Process (07 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Quiz (1 and 2) (optional)	01
Semester End Exam	03
Total	**07**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3											3	
CO2	2	3										2	
CO3	2	3										3	
CO4	2	3										2	

Course Title	MICROCONTROLLERS		
Course Code	25EE402	(L-T-P) C	(3-0-2) 4
CIE	50	Hours/Week	5
SEE	50	Total Hours	42L +28P+50ABL = 120

Course Objective: To understand the fundamentals of computer organization and develop programming skills in ARM Cortex-M3, LPC 1768 for embedded interfacing applications.

Course outcomes: At the end of course, student will be able to:

Sl. No.	Course Outcomes	Mapping to POs	Mapping to PSOs
1	Understand the fundamentals of computer organization to realise working of microcontrollers	1	2
2	Apply the architectural features of ARM microcontrollers to develop applications.	1,2	2
3	Interface peripheral devices to ARM microcontrollers	1,2,3	2
4	Write embedded 'C' programs to control various I/O devices with the LPC1768 ARM Cortex-M3 controller	1,2,3,5,11	2

MODULE-1 — 10 Hrs

Introduction : Functional units of the Computer, Basic Operational Concepts, Software levels of execution

Machine Instructions: Numbers, Arithmetic Operation(signed and unsigned), Characters, Memory Location and Operation, Instruction , Instruction sequencing(Straight line and Branching),Decoding and Encoding of Instruction, Addressing Modes, Stack, Queue, Subroutine,

Interrupts (I/O Devices) : Interrupt Hardware, Enabling and Disabling Interrupts, Types of Handling Devices , Exceptions(ISR)

SLC : Performance of the Processor, Condition Codes

MODULE-2 — 10 Hrs

Memory System: Connection of the Memory to the Processor, Memory Cell (static and dynamic), Memory hierarchy, DMA

Basic Processing Unit: Fundamental Concepts, Register Transfer, Performing an Arithmetic or Logic Operation Arithmetic circuit (carry look ahead addition- 4 bit)

SLC : Multiplication Register Configuration

MODULE-3 — 11 Hrs

ARM Cortex M3 Microcontroller Continued: ARM Technology overview and design philosophy, ARM Processor Modes, ARM Processor Embedded Hardware and Software ARM Memory Mapping, PSR, Register Set, Data Flow Model, Data Processing Instruction, Data Transfer Instructions, Control Flow and Conditional Execution.

Peripherals and Programming: GPIOs Configuration, Timers, Sys Tick Timers, NVIC Controllers, DAC, ADC Embedded C Example Programs.

SLC: Watch Dog Timer, Pulse Width Modulation

MODULE - 4 — 11 Hrs

ARM Microcontroller and Communication Protocols and Programming: UARTs, I2C, SPI, Embedded C Example Programs

ARM Microcontroller Interfacing: Interfacing of Switches, Buzzer, Seven Segment Display, LCD (8 bit mode), Keypad (4*4), DC Motor, Stepper Motor, Relay, Ultrasonic sensor, PIR Sensor, Embedded C Example Programs.

SLC: CAN protocol, Interfacing Temperature Sensor

Prescribed Text Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	Computer Organisation	Carl Hamacher Zvonko Vranesic Saftwat Zaky	5th	Tata MGH	2002
2.	The Definitive Guide to ARM Cortex M3	Joseph Yiu	2nd	Newnes	2010
3.	ARM System Developer's Guide	Andrew N Sloss, Dominic Symes, Claris Wright	2nd	-	-

Reference Books:

Sl. No	Book Title	Authors	Edition	Publisher	Year
1.	ARM System On-Chip Architecture	Steve Furber	2nd	Pearson Education	-

E Books and online course materials:

1. https://wiki.ifsc.edu.br/mediawiki/images/2/29/MIPM3TUG.pdf

Online Courses and Video Lectures:

1. https://onlinecourses.nptel.ac.in/noc22_cs93/preview
2. https://www.udemy.com/course/stm32-introduction-to-stm32-stm-electronics/?srsltid=AfmBOormJMIbjhQ7n0udXGFfYw-2neNmIOt4jI7dMNq9fi8p0ca9_5mk&couponCode=CP130525

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Writing Record Laboratory CIE	10 10
Total		**50**

List of Experiments	**28 hrs.**
Interfacing using ARM Cortex M3 LPC 1768 1. Interfacing a simple switch and display its status Relay, Buzzer 2. Interfacing LEDs to ON parallel and serially 3. Interfacing bidirectional DC motors with and without PWM 4. Interfacing stepper motor to rotate in clockwise or anticlockwise direction 5. Generate non- sinusoidal waveforms with variable amplitude and frequency using internal DAC 6. Display the output for given analog input (any sensor) using internal ADC 7. Interface 4x4 Key Matrix 8. Interface LCD 16x2 alphanumeric display 9. Internal DAC Interface to generate square wave, triangular, sine wave 10. Interfacing two digit multiplexed 7 – segment display	

Activity based learning (29 Hours)

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	2	14	28
2	Student Study Hours – Self Learning	1	14	14
3	Evaluation of Learning Process	-	-	07
4	Activity Based Learning (ABL)	-	-	15+14=29
ABL 1 : Components Survey (15 Hrs)				
Prerequisite of the project		List out the different types of microcontrollers		2
		Understanding the Features of above listed Microcontrollers		4
		List out the types of LEDs, Any Sensor		2
		Understand the working principle of the above peripherals		4
		Submission of the report		3
ABL 2 : Low Cost Mini Project (14 Hrs)				
Project Based Learning		Interface LEDs/Any sensor to the µC		2
		Programming using embedded 'C'		4
		Project Presentation		4
		Submission of the report		4
Total Learning Hours / Semester				**120**

Evaluation of Learning Process (07 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Activity 1 and 2	01
Semester End Exam	03
Total	**07**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	2
CO4	3	3	3	-	3	-	-	-	-	-	3	-	3

Course Title	DC MACHINES AND SYNCHRONOUS MACHINES		
Course Code	25EE403	(L-T-P) C	(3-0-0) 3
CIE	50	Hours/Week	3
SEE	50	Total Hours	42L + 48ABL = 90

Course Objective: To analyze different types of synchronous machines and special electrical machines.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Interpret the concepts of DC and synchronous machines.	1	1
2	Explain the principle operation of special electrical Machines.	1	1
3	Analyze the performance of DC and Synchronous machines and special electrical machines.	1,2	1
4	Solve various types of numerical problems, with respect to DC and synchronous machines	1,2	1

MODULE - 1 **10 Hrs.**

DC Generator - Classification of DC generator, types of armature winding, EMF equation, armature reaction, commutation, No load & load characteristics. DC Motors - Classification, Back EMF equation, Torque equation, Characteristics of shunt, series & compound motors, speed control of shunt & series motors, losses in DC machines - both generator and motor

MODULE - 2 **10 Hrs.**

Special Machines: Introduction, Variable Reluctance Stepper Motor, Permanent Magnet Stepper Motor, Hybrid Stepper Motor, Windings in Stepper Motors, working principle, Torque Equation, Applications of Stepper Motor Classifications of permanent magnet motors, Construction and working principle of Permanent Magnet DC (PMDC) motor, Brushless Permanent Magnet DC (BLDC) Motors.

MODULE - 3 **12 Hrs.**

Synchronous Machines: Basic principles of operation, construction of salient and non-salient pole synchronous machines, Generated EMF considering the effect of distribution and short chording of winding, causes of harmonics and its elimination, slot harmonics, methods of reducing slot harmonics. Numerical Problems.

MODULE - 4 **10 Hrs**

Voltage Regulation: Armature reaction, reasons for voltage drops in synchronous machines, EMF, MMF & ZPF methods of determining voltage regulations, comparative studies. Numerical Problems.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Electric Machinery	P. S. Bhimbra	-	Khanna Publishers	-
2	Electric machines	I. J. Nagrath & D. P. Kothari	3rd	TMH	-
3	Special Electrical Machines	K Venkataratnam	-	Universities Press	2024

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Theory of Alternating Current Machines	A. S. Langsdorf	2nd	Tata McGraw Hill	1993
2	Electrical Machines	V. K. Mehta and Rohit Mehta	2nd	S. Chand & Co	
3	Problems in Electrical Engineering	N. N parker Smith		CBS publishers	

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Student Study Hours – Self Learning	1	14	14
3	Evaluation of Learning Process	-	-	07
4	Activity Based Learning **(ABL)**	-	-	14+13=27
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted Activity 1: Substation visit and detailed report of that visit	10
	Activity 2: Presentation of Self learning concepts	10
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 : Substation visit and detailed report of that visit		
Substation visit and detailed report of that visit	Introduction	02
	Company Profile	03
	Objectives of the Visit	03
	Visit Details	03
	Observation and Learning's	03
ABL1: Total		**14**
ABL 2 : Presentation of Self learning concepts		
Presentation of Self learning concepts	Preparation of a report	03
	Preparation of slides	03
	Presentation	04
ABL2: Total		**13**
ABL1 + ABL2: Total		**27**

Evaluation of Learning Process (07 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Quiz (1 and 2) (optional)	01
Semester End Exam	03
Total	**07**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2											2
CO2	3	2											2
CO3	3	2											2
CO4	2	3											2

Course Title	OPERATIONAL AMPLIFIERS AND LINEAR ICs		
Course Code	25EE404	(L-T-P) C	(3-0-0) 3
CIE	50	Hours/Week	3
SEE	50	Total Hours	42L + 48ABL = 90

Course Objective: To design op-amp based electronic circuits for different applications.

Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Analyze Op-Amp based AC amplifiers.	1	2
2	Realize signal conditioning electronic circuits using Op-Amp.	1	2
3	Develop Op-Amp based non-linear electronic circuits.	1,2	2
4	Design electronic circuits to generate waveforms and filter noises using Op-Amp.	1,2,3	2

MODULE-1	11 Hrs

Op-amps as AC Amplifiers: Capacitor coupled voltage follower, High Zin capacitor coupled voltage follower, Capacitor coupled non-inverting amplifier, High Zin capacitor coupled non–inverting amplifier, Capacitor coupled inverting amplifier, setting upper cutoff frequency, Use of single polarity supply.

MODULE-2	10 Hrs

Signal Processing circuits: Design of Precision half-wave and full-wave rectifiers, Limiting circuits, Clamping circuits, Peak detectors, Sample-and-Hold (S/H) circuit.

MODULE-3	10 Hrs

Op-amps and Non-linear circuits: Op-amps in switching circuits, Crossing detectors, Inverting Schmitt trigger circuits. Non-inverting Schmitt circuits, Astable multivibrator, Monostable multivibrator.

MODULE-4	11 Hrs

Signal generator: Triangular/Rectangular wave generator without frequency and duty cycle adjustment, Phase shift oscillator, Wein bridge oscillator. Active filters: First and Second order Low-pass and High-pass filters; First order Band pass filter and First order Band stop filter.

Note: Students are permitted to use op-amp data sheets and standard Resistor and capacitor values list, for solving the design connected numerical problems in the examination. The said information is available in the Appendix of Text authored by David A. Bell.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Operation Amplifiers and Linear ICs	David A. Bell	2nd	Prentice Hall of India	2008

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Op-Amps and Linear Integrated Circuits	Ramakanth A. Gayakwad	4th	Pearson Education	2007
2	Operational amplifiers and Linear Integrated Circuits	R. Coughlin & F. Driscoll	6th	Prentice Hall of India	2004

E Books and online course materials:

1. http://gnindia.dronacharya.info/ECE/5thSem/Downloads/IntegratedCircuits/Books/Integrated-Circuit-Text-Book-5.pdf

Online Courses and Video Lectures:

https://onlinecourses.nptel.ac.in/noc24_ee73/preview

Teaching -Learning– Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Student Study Hours – Self Learning	1	14	14
3	Evaluation of Learning Process	-	-	07
4	Activity Based Learning **(ABL)**	-	-	14+13=27
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (50 marks):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Simulation based Assignment 2) Hands on laboratory experiments	10 10
Total		**50**

Activity Based Learning (27 Hours)

ABL 1 (14 Hours) : Simulation Based Activity		**Hours**
Simulation based Assignment	Precision Half Wave Rectifier Precision Full Wave Rectifier Summing And Differential Amplifiers RC Phase Shift Oscillator And Determination Of Frequency Of Oscillation	**08**
	Report writing	04
	Submission	02
ABL1: Total		**14**
ABL 2 (13 Hours): Laboratory Activity		
Hands on laboratory experiments	1. Realization of Schmitt trigger circuit using an op – amp for desired upper trip point (UTP) and lower trip point (LTP). 2. Test low-pass and high-pass active filter circuits using IC 741. 3. Realization of Digital to Analog Converter (DAC) circuit using an op – amp. 4. Realization of Analog to Digital Converter (ADC) circuit using an op – amp.	05
	Experimental set up and demonstration	05
	Submission of report	03
ABL2: Total		**13**
Total (ABL1+ABL2)		**27**

Evaluation of Learning Process (07 Hours)

Type of Evaluation	Hours
CIE (1, 2 and 3)	03
Activity (1 and 2)	01
Semester End Exam	03
Total	**07**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	1											2
CO2	3	1											2
CO3	3	2											2
CO4	3	2	1										2

Course Title	SIGNALS AND DIGITAL SIGNAL PROCESSING		
Course Code	25EE405	(L-T-P) C	(3-0-0) 3
CIE	50	Hours/Week	3
SEE	50	Total Hours	42L + 48ABL = 90

Course Objective: To classify signals and transform them to frequency domain. They will analyse basic properties of systems in time domain.

Course Outcomes: At the end of course, students will be able to:

#	Course outcomes	Mapping to PO's	Mapping to PSO's
1	Represent and categorize various types of signals and systems, and analyse their basic properties.	1,2,5	2
2	Evaluate and analyse linear time-invariant systems using convolution sums, convolution integrals, and differential equation solutions.	1,2,5	2
3	Apply DFT and FFT techniques to transform and analyse discrete-time signals.	1,2,5	2
4	Analyze the structure and realization of FIR and IIR digital systems using various realization forms.	1,2,5	2

MODULE-1	10 Hrs.

Introduction: Definition of a signal and a system, Classification of signals, Basic operations on signals, Elementary signals and Properties of systems.

MODULE-2	10 Hrs.

Impulse Response representations for LTI Systems: Properties of Impulse Response Representation of LTI Systems - Memoryless Systems, Causality and Stability. Concepts of Convolution, Computation of Convolution Sum and Convolution integral, Solution of Differential equations.

MODULE-3	10 Hrs.

Discrete Fourier Transforms: Definitions, Circular shift, Properties of DFTs, Circular convolution, Stockham's method, Linear convolution of two finite duration sequences, Filtering of long sequences.

MODULE-4	10 Hrs.

Fast Fourier Transforms algorithms: Introduction, decimation in time algorithm, decimation in frequency algorithm, decomposition for 'N' a composite number, computation of DFTs and IDFTs. **Realization of digital systems:** Introduction, block diagrams, Realization of IIR systems-direct form, Cascade form and Parallel form. **Realization of FIR systems**: Introduction, Direct form, cascade form, linear phase realizations.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
2.	Signals and Systems	Simon Haykin Barry Van Veen	2nd	Wiley	2007
3.	Digital Signal Processing	John G. Proakis and Dimitris G. Manolakis	4th	Pearson	2017

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
5.	Signals and Systems	D. Ganesh Rao & Satish Tunga	4th	Pearson	2010
6.	Digital Signal Processing	A. Nagoor Kani	2nd	Mc GrawHill	2017

E Books and online course materials:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://studentshubblog.wordpress.com/wp-content/uploads/2014/12/signals-and-systems-simon-haykin.pdf

2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://uvceee.wordpress.com/wp-content/uploads/2016/09/digital_signal_processing_principles_algorithms_and_applications_third_edition.pdf

Online Courses and Video Lectures:

1. https://archive.nptel.ac.in/courses/108/104/108104100/
2. https://nptel.ac.in/courses/117102060

Teaching - Learning – Evaluation Scheme:

Sl. No	Teaching and Learning Method	No. of Hours/ Week	No. of Weeks	Hours/ Semester
1	Class Room Teaching & Learning	3	14	42
2	Integrated Lab Component	-	-	-
3	Student Study Hours – Self Learning	1	14	14
3	Activity Based Learning (ABL1 & ABL2)	-	-	27
4	Evaluation of Learning Process	-	-	07
Total Learning Hours / Semester				**90**

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Activity 1: Matlab Simulation for 10 Marks 2) Activity 2: Assignment and Quiz for 10 Marks	20
Total		**50**

Evaluation of Learning Process (7 Hours)

Type of Evaluation	Hours
Test (1, 2 and 3)	3
Quiz (1 and 2) (optional)	1
Semester End Exam	3
Total	**7**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	1		2								**2**
CO2	**2**	**3**	**1**		**2**								**2**
CO3	2	3	1		2								**2**
CO4	2	3	1		2								**2**

Course Title	DIGITAL ELECTRONIC CIRCUITS LABORATORY		
Course Code	25EE406	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To implement combinational and sequential digital circuits using gates.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Realize combinational circuits using principles of boolean algebra.	1, 2, 3, 5, 11	1,2
2	Construct sequential circuits using different flip flops.	1, 2, 3, 4, 5, 11	1,2
3	Demonstrate effective communication and teamwork skills through collaborative execution of laboratory experiments.	7, 8, 9, 10	1

LIST OF EXPERIMENTS

1. Simplification, realization of Boolean expressions using logic gates/Universal gates.
2. Realization of half adder and full adder circuits.
3. Realization of Parallel adders and subtractors circuits.
4. Realization of Binary to Excess code conversion
5. Realization of Binary to Gray code conversion and vice versa.
6. Testing of Ring counter and Johnson counter.
7. Design of Sequence generator using D-flip flops.
8. Truth table verification of flip-flops: (i) J K Master slave (ii) T type and (iii) D type.
9. Realization of SISO, SIPO, PISO, PIPO shift registers.
10. Truth table verification of 1-bit and 2-bit comparator.

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	-	2	-	-	-	-	-	1	3	2
CO2	3	2	3	2	2	-	-	-	-	-	1	3	2
CO3	-	-	-	-	-	-	-	3	3	1	-	1	-

ABILITY ENHANCEMENT COURSE – IV

Course Title	WEB TECHNOLOGY LABORATORY		
Course Code	25AEEE41	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To demonstrate effective written and oral communication skills by composing professional reports and delivering structured presentations.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Develop web pages using HTML, DHTML and Cascading Styles sheets.	1, 3, 5, 7, 8, 9, 11	2
2	Build and consume web services.	1, 2, 3, 4, 5, 7, 8, 9, 10, 11	2
3	Develop a Program using XML.	1, 2, 3, 5, 7, 8, 9, 11	2

LIST OF EXPERIMENTS

1. Introduction to web technology
2. Create a HTML page, which has properly aligned paragraphs with image along with it
3. Write a program to display list of items in different styles.
4. Create both client side and server side image maps.
5. Create your own style sheets and use them in your web page.
6. Create a form with various fields and appropriate front and validations using any one of the scripting languages.
7. Write a program to store the form fields in a database, use any appropriate Server Slide Scripting.
8. Create a web page using XML.
9. Write a program to connect a XML web page to any database engine.

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	3	-	3	-	2	2	1	-	1	-	2
CO2	2	3	3	2	3	-	2	2	1	1	2	-	3
CO3	2	2	2	-	3	-	2	2	1	-	1	-	2

Course Title	DATA STRUCTURES LABORATORY		
Course Code	25AEEE42	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To understand and implement fundamental data structures and algorithms for efficient data storage, processing, and problem-solving.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Implement linear data structures such as linked lists, stacks, and queues.	1,2,3,4,5,7,8,9,11	2
2	Apply searching and sorting algorithms for efficient data organization and retrieval.	1,2,3,4,5,7,8,9,11	2
3	Implement tree-based data structures and perform traversal, insertion, deletion, and searching operations.	1,2,3,4,5,7,8,9,11	2

LIST OF EXPERIMENTS

1. Creation and Manipulation of Singly Linked Lists
2. Construction and Management of Doubly Linked Lists
3. Implementation of Circular Linked Lists for Dynamic Data Handling
4. Stack Operations Using Array-Based and Linked List-Based Approaches
5. Queue Operations Using Sequential and Linked Representations
6. Circular Queue Implementation and Comparative Study of Search Algorithms
7. Comparative Implementation of Elementary Sorting Algorithms
8. Comparative Implementation of Efficient Sorting Algorithms
9. Linked List-Based Dictionary ADT Implementation
10. Binary Search Tree Construction and Element Management
11. Traversal Techniques for Tree Data Structures
12. Balanced Binary Search Tree (AVL Tree) Operations and Maintenance

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	3	-	2	2	1	-	2	-	2
CO2	3	3	2	2	3	-	2	2	1	-	2	-	2
CO3	3	3	2	2	3	-	2	2	1	-	2	-	2

Course Title	PCB DESIGN LABORATORY		
Course Code	25AEEE43	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To provide hands-on experience in PCB design using EDA tool.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Develop schematics and PCB layouts.	1, 3, 5, 7, 8, 9, 11	1, 2
2	Design basic analog and digital circuits.	1, 2, 3, 5, 7, 8, 11	1, 2
3	Design application-based PCBs for sensing and control projects.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	1, 2

LIST OF EXPERIMENTS

1. Design of an IR Proximity Sensor – Touchless Door Bell using Zero PCB
2. Design PCB schematic and Layout for 5V dc Power Supply.
3. Design and simulation of a Half and Full Wave Rectifier
4. Design of a PCB layout of simple transistor tester circuit.
5. Design of a PCB layout of Low pass and High Pass filter
6. Design PCB schematic and Layout the layout for a simple BJT amplifier circuit.
7. Design of a Water Level Indicator circuit
8. Design a single layer an obstacle detection PCB for robotics and security applications.

Course Articulation Matrix

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	-	3	-	3	-	2	2	1	-	1	3	2
CO2	3	2	3	-	2	-	2	2	-	-	1	3	2
CO3	3	2	3	2	3	1	2	2	1	1	2	3	3

Course Title	IOT LABORATORY		
Course Code	25AEEE44	(L-T-P) C	(0-0-2) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28P + 02 = 30

Course Objective: To apply IoT technologies for real world engineering applications.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	Apply embedded programming techniques to interface sensors and control devices.	1, 2, 3, 4, 5, 7, 8, 9, 11	1, 2
2	Implement IoT solutions for remote data acquisition and device management.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	1, 2
3	Develop intelligent monitoring and automation systems using embedded hardware platforms.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	1, 2

LIST OF EXPERIMENTS

1. Traffic light control system using Arduino UNO.
2. Interfacing ultrasonic sensor with Arduino UNO for Obstacle detection and Distance measurement
3. Interfacing IR sensor with Arduino UNO for DC motor control
4. Interfacing soil moisture sensor with Arduino Uno for detect moisture in the soil
5. Interfacing LDR sensor with Arduino UNO to switch on/off 230V bulb using 5V Relay
6. Greetings message through webpage with ESP as server.
7. Temperature and humidity monitoring in cloud platform
8. Servo motor control with webpage
9. WIFI weather station tool and analysis
10. Temperature and humidity monitoring with Raspberry Pi

Course Articulation Matrix

COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	3	-	1	1	1	-	1	3	2
CO2	3	3	2	2	3	1	1	1	1	1	2	2	3
CO3	3	3	3	2	3	1	1	1	1	1	2	3	3

Course Title	BIOLOGY FOR ENGINEERS		
Course Code	25BE	(L-T-P) C	(0-2-0) 1
CIE	50	Hours/Week	2
SEE	50	Total Hours	28 + 02 = 30

Course Objective: To analyze the basic biological concepts and their engineering applications.

Course Outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1	To familiarize engineering students with basic biological concepts in an engineering perspective.	6,7,8,9,10,11	-
2	To involve students in an interdisciplinary vision of biology and engineering	6,7,8,9,10,11	-
3	To gain the realization of translation of natural engineering in biological systems into novel devices in man-made engineering domain.	6,7,8,9,10,11	-
4	To gain the realization of translation of natural engineering in biological systems into novel devices in man-made engineering domain.	6,7,8,9,10,11	-

MODULE - 1	8 Hrs.

Introduction to Human Anatomy: Overview of human anatomy, Structural organization of the human body - cardiovascular system, endocrine system, digestive system, respiratory system, excretory system, lymphatic system, nervous system, muscular system and skeletal system.

MODULE - 2	6 Hrs.

Receptors (Sensors) and Effectors (Actuators): Comparative study of biological principles with Electrical principles, Sense Organs; External and Internal sense organs, Effectors; Muscles and glands, brief introduction to Sensory and motory nerves, Comparative Study of Sensors and Actuators (Engineering system) based on the concepts of Receptors and Effectors in Human body

MODULE - 3	6 Hrs.

Communication system in Human Body: Nervous system; Neurons, Organ of human body, Nerves; Cranial nerves, Spinal nerves and visceral nerves, Functioning of various nerves as Sensory nerves, Motory nerves and Relay nerves, Comparison of natural communication system with the design of engineering system

MODULE - 4	8 Hrs

Controls involved in Human Body: Controls involved in Human Body: Introduction to Open loop and Closed loop system, Role of Endocrine system in control process of many parameters, study of natural Control in various biological systems, Extending the concept of Biological Open loop and closed loop systems to the field of automation, Case studies.

Prescribed Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Biology for Engineers	Johnson A T	-	CRC Press	2018

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1	Handbook of General Anatomy	B D Chaurasia's	4th	-	-

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
CIE	Three CIEs conducted for 20 marks each and reduced to 10 marks	30
Activity Details	Details of activities to be conducted 1) Details of activity 1 2) Details of activity 2	20
Total		**50**

Course Articulation Matrix

Course Outcomes	Program Outcomes												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1						3	1	3	1	3	2		
CO2						3	1	3	1	3	2		
CO3						2	3	2	3	2	2		
CO4						2	3	2	3	2	2		

Semester IV			
Yoga - II			
Course Code	25YOG2	**CIE**	100 Marks
Course Type	NCMC		
Total Hours	2 hrs/week		

Course Objectives

The objectives of this course are to:

1. Introduce students to the origin, history, philosophy, and fundamental concepts of Yoga.
2. Familiarize students with the different schools of Yoga, its aims, objectives, and the importance of prayer in Yogic practice.
3. Develop awareness of the rules, regulations, and safety precautions to be followed during Yogic practices.
4. Enable students to learn and practice Suryanamaskara and selected Yogasanas with proper techniques for improving physical and mental well-being.
5. Promote a healthy life style by encouraging regular Yogic practice, correcting misconceptions about Yoga, and fostering positive health, self-discipline, and overall wellness.

Patanjali's Ashtanga Yoga: Patanjali's Ashtanga Yoga, its need and importance. Yama: Ahimsa, satya, asteya, brahmacharya, aparigraha, Niyama : shoucha, santosh, tapa, svaadhyaya, Eshvarapranidhan, Suryanamaskar 12 count 4 rounds. Different types of Asanas: Sitting 1. Sukhasana, 2.Paschimottanasana, Standing1. Ardhakati Chakrasana, 2.ParshvaChakrasana, Prone line 1. Dhanurasana Supine line 1. Halasana, 2. Karna Peedasana

Kapalabhati: Meaning, importance and benefits of Kapalabhati. 40strokes/min3 rounds Pranayama–1. Suryanuloma–Viloma, 2.Chandranuloma-Viloma, 3-Suryabhedana, 4-Chandra Bhedana, 2.Nadishodhana, 3-BhramariPranayama, Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Explain the origin, history, philosophy, objectives, and different schools of Yoga, along with its role in promoting holistic health and well-being.
2. Understand and apply the rules, regulations, and ethical practices associated with Yogic exercises, including the significance of prayer and Suryanamaskara.
3. Demonstrate the correct techniques of selected Yogasanas, such as sitting, standing, prone, and supine postures, while observing appropriate precautions.
4. Analyze the physical, mental, and therapeutic benefits of Yogic practices and distinguish between authentic Yogic practices and common misconceptions about Yoga.
5. Adopt Yoga as a regular life style practice to enhance physical fitness, mental wellness, discipline, and overall quality of life.

Suggested Learning Resources: (TextBook/ReferenceBook/Manuals):

Text books:

1. George Feuerstein: the yoga Tradition (its history, literature, philosophy and practice)
2. Sri Ananda: The complete Book of yoga Harmony of Body and Mind (Orient paper Backs: Vision Books Pvt.Ltd..1982.
3. B.K.Slyenkar: Light on the Yoga sutras of Patanjali (Haper Collins Publications India Pvt.Ltd.New Delhi.)
4. Science of Divinity and Realization of Self Vethathiri Publication,(6-11)WCSC,Erode

Reference books/Manuals:

1. Principles and Practice of Yoga in Health Care,Publisher:Handspring Publishing Limited. ISBN:9781909141209,978190914209
2. BasavaraddiIV: Yoga in School Health, MDNIY NewDelhi. 2009
3. Dr.HR.Nagendra: Yoga Research and application (Vivekanda Kendra Yoga Prakashana Bengalore)
4. Dr.Shirley Telles: Glimpses of Human Body (Vivekanda KendraYoga Prakashana Bengalore).

Web links and Video Lectures (e-Resources):

Search by topics to get the videos

Assessment Structure:

This course is having only **Continuous Internal Assessment** (CIE) marks of 100.

Weightage	**Marks**
Attendance to all the sessions	20Marks
Practical sessions on Yoga and Its Benefits	40Marks
Two Assignments	40Marks
Total Marks	100

A student shall obtain a minimum of 40% marks or 40 marks out of 100 to qualify in the course.

Semester:IV						
PHYSICAL EDUCATION (SPORTS & ATHLETICS)– II						
Course Code	**:**	25PE2		**CIE**	**:**	**100 Marks**
Course Type	**:**	NCMC				
Total Hours	**:**	15 P				

Course Outcomes: At the end of the course, the student will be able to

1. Understand the ethics and moral values in sports and athletics
2. Perform in the selected sports or athletics of student's choice.
3. Understand the roles and responsibilities of organization and administration of sports and games.

Module I: Ethics and Moral Values **4 Hours**

A. Ethics in Sports
B. Moral Values in Sports and Games

Module II : Specific Games (Any one to be selected by the student) **16 Hours**

A. Volleyball –Attack, Block, Service, Upper Hand Pass and Lowerhand Pass.
B. Athletics (Track Events) –Any event as per availability of Ground.

Module III : Role of organisation and administration **4 Hours**

Scheme and Assessment for auditing the course and Grades:

Sl.No.	Activity	Marks
1.	Participation of student in all the modules	20
2.	Quizzes/Assignment–2,eachof 20marks	40
3.	Final presentation/exhibition/Participation in competitions/ practical on specific tasks assigned to the students	40
	Total	**100**