

DON BOSCO INSTITUTE OF TECHNOLOGY

(Autonomous Institute affiliated to VTU, Belgavi, Approved by AICTE, Recognised by the Government of Karnataka, NAAC A Grade Accredited).

Kumbalgodu, Mysuru Road, Bengaluru 560074



DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

UNDERGRADUATE PROGRAM

(NBA Accredited 2025-2028)

OUTCOME BASED CURRICULUM & ASSESSMENT

Scheme and Syllabus

III & IV Semester

For the 2024 Admitted Batch



Vision of the Institute

To be a center of excellence to transform young minds in technical and management education fostering innovation and entrepreneurial skills with ethical, environmental, and social responsibility.

Mission of the Institute

M1: To impart quality education in order to meet the needs of industry and society.

M2: To collaborate with academia, industry and research institutes to strengthen teaching and learning process.

M3: To promote equitable and harmonious development of students to work in teams.

M4: To imbibe lifelong learning skills and entrepreneurial skills exhibiting leadership.

Core Values

i) Attain excellence in different disciplines by creating, preserving and disseminating knowledge to all aspiring students

ii) Draw inspiration from the Institutions ethos and develop within its members a sense of accountability towards their community, society and the nation at large

iii) Accept the challenges globalization and changing times throw at us to offer high quality education and developmental services in a competitive manner

iv) Provide every opportunity to the Institutions key constituents-its faculty, staff, students and the community-to excel in their domain of expertise and contribute to every task with sincerity

v) Transition from the teacher - centric focus to the learner - centric approach in imparting knowledge

Vision of the Department

Aspire to be a center of excellence to impart value based education in the field of Electrical and Electronics Engineering to transform the young minds to serve the societal needs.

Mission of the Department

M1: To provide theoretical and practical knowledge in the field of Electrical and Electronics Engineering.

M2: To enhance the computational skills by usage of software tools.

M3: To provide the learning environment to gain knowledge of Inter-disciplinary domains.

M4: To collaborate with industry to facilitate learning beyond the curriculum.

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 Outcomes

P01	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.
P02	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
P03	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)
P04	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).
P05	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)
P06	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).
P07	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
P08	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
P09	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
P010	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.
P011	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)

Program Specific Outcomes

PSO1	Apply the fundamentals of mathematics, electrical and electronics engineering knowledge to formulate and solve the problems.
PSO2	Use the tools and techniques to implement the solutions in the area of electrical and electronic systems.
PSO3	Develop the ability of interpersonal skills for successful adaptation in multi-disciplinary platform.

Program Educational Objectives

PEO1	To contribute in implementation of products and services through technology development in the area of electrical engineering and allied fields.
PEO2	To develop professionally through training and lifelong learning keeping abreast of the technology developments.
PEO3	To develop leadership qualities and entrepreneurship skills.

COURSE CATEGORY

Humanities, Social Sciences, and Management Courses	HSMC
Basic Science Courses	BSC
Engineering Science Courses	ESC
Emerging Technology Courses	ETC
Professional Core Courses	PCC
Professional Elective Courses	PEC
Open Elective Courses	OEC
Integrated Professional Core Courses	IPCC
Project Work: Dissertation, Mini-project work and Major Project work	PROJ
Seminar	SEM
Internship	INT
Ability Enhancement Courses	AEC
Non Credit Mandatory Courses	NCMC
Audit Course	AC

INDEX

Sl. #	Contents	Page #
1	Scheme of Teaching and Examinations 2024 - 3rd Semester	i
2	Scheme of Teaching and Examinations 2024 - 4th Semester	iii
3	Assessment Pattern	v
4	3 rd Semester Syllabus	
	B24MAT31E- Fourier Series, Transforms and Numerical Techniques	1
	B24EE32- Electric Circuit Analysis	4
	B24EE33 - Transformers and Generators	8
	B24EE34 - Analog Electronic Circuits	12
	B24EE351 - Digital Logic Circuits	15
	B24EE352 - Introduction to Earthing Practices	18
	B24EE353- Electromagnetic Fields	21
	B24EE354 - Electrical Safety	24
	B24SCK36 - Social Connect and Responsibility	27
	B24EE371 - Digital Electronics Lab	35
	B24EE372 - C++ Programming Lab	37
	B24EE373 - Introduction to MATLAB and Simulink	40
	B24EE374- Electrical Hardware Lab	44
	B24EEL38 - Analog Electronic Circuits Lab	46
	B24NSK391 - NATIONAL SERVICE SCHEME (NSS)	49
	B24PEK391 - PHYSICAL EDUCATION (SPORTS & ATHLETICS)	55
	B24YOK391 – YOGA	63
5	4th Semester Syllabus	
	B24MAT41E - Statistics, Probability and Complex Variables	67
	B24EE42 - Power Electronics	71
	B24EE43 - Electric Motors	76
	B24EE44 - Transmission and Distribution	80
	B24EE451 - Electrical Power Generation and Economics	85
	B24EE452 - Op-Amp and LIC	89
	B24EE453 - Sensors and Transducers	92
	B24EE454 - Introduction to EV Technology	95

	B24BOE46 - Biology For Engineers	98
	B24EE471 - Basics of VHDL Lab	102
	B24EE472 - PCB Design using Or CAD /any other tool	105
	B24EE473 – IOT Lab	107
	B24EE474 - MATLAB for Electrical and Electronic Measurements	109
	B24UHK48 - Universal Human Values	112
	B24EEL49 - Python Programming for Electrical Engineers	116
	B24NSK410 - NATIONAL SERVICE SCHEME (NSS)	119
	B24PEK410 - PHYSICAL EDUCATION (SPORTS & ATHLETICS)	125
	B24YOK410 – YOGA	133
	B24SDC411 - Ready to Rise	138

DON BOSCO INSTITUTE OF TECHNOLOGY
(Autonomous Institution affiliated to VTU, Belagavi)
 B.E. in Electrical and Electronics Engineering
 Scheme of Teaching and Examinations 2024
 (Academic year 2025-26)

SEMESTER: III

Sl No	Course Category	Course Code	Course Title	Teaching Department (TD)	Board of Examiner (BoE)	Teaching Hours / Week	SAAE Hours/ Semester	Examination			Credits
						L:T:P:S		Duration in hours	CIE: SEE Marks	Total Marks	
1	BSC	B24MAT31E	Fourier Series, Transforms and Numerical Techniques	MATHS	MATHS	3:0:0:0	48	03	50:50	100	3
2	IPCC	B24EE32	Electric Circuit Analysis	EEE	EEE	3:0:2:0	48	03	50:50	100	4
3	IPCC	B24EE33	Transformers and Generators	EEE	EEE	3:0:2:0	48	03	50:50	100	4
4	PCC	B24EE34	Analog Electronic Circuits	EEE	EEE	3:0:0:0	48	03	50:50	100	3
5	ESC	B24EE35x	ESC/ETC/PLC	EEE	EEE	3:0:0:0	48	03	50:50	100	3
6	UHV	B24SCK36	Social Connect and Responsibility	Any Department	CS	0:0:2:0	00	-	100:0	100	0
7	AEC	B24EE37x	Ability Enhancement Course - III	EEE	EEE	(If the course is a theory) 1:0:0:0	16	01	50:50	100	1
						(If the course is a Lab) 0:0:2:0	00	03			
8	PCCL	B24EEL38	Analog Electronic Circuits Lab	EEE	EEE	0:0:2:0	00	03	50:50	100	1
9	NCMC	B24NSK391	NATIONAL SERVICE SCHEME (NSS) - I	NSS Coordinator	PED	0:0:2:0	00	-	100:0	100	0
		B24PEK391	PHYSICAL EDUCATION (SPORTS & ATHLETICS) - I	Physical Education Director							
		B24YOK391	YOGA I	Yoga Teacher							
Total								550:350	900	19	

PCC: Professional Core Course, **PCCL:** Professional Core Course laboratory, **UHV:** Universal Human Value Course, **NCMC** Non Credit Mandatory Course **AEC:** Ability Enhancement Course, **SEC:** Skill Enhancement Course, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:**Semester End Evaluation. **K:** This letter in the course code indicates common to all the stream of engineering. **ESC:** Engineering Science Course, **ETC:** Emerging Technology Course, **PLC:** Programming Language Course

Engineering Science Course (ESC/ETC/PLC)

B24EE351	Digital Logic Circuits	B24EE353	Electromagnetic Fields
B24EE352	Introduction to Earthing Practices	B24EE354	Electrical Safety
Ability Enhancement Course - III			
B24EE371	Digital Electronics Lab	B24EE373	Introduction to MATLAB and Simulink
B24EE372	C++ Programming Lab	B24EE374	Electrical Hardware Lab

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching-Learning hours (L: T: P: S) can be considered as (3: 0: 2:0) or (2: 2: 2:0). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B. Tech.) 2024-25 may please be referred.

National Service Scheme / Physical Education / Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Dept. Member Convenor

Head of the Department

Dean - Academics

Principal

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 B.E. in Electrical and Electronics Engineering
 Scheme of Teaching and Examinations 2024
 (Academic year 2025-26)

SEMESTER: IV

Sl No	Course Category	Course Code	Course Title	Teaching Department (TD)	Board of Examiner (BoE)	Teaching Hours /Week	SAAE Hours/ Semester	Examination			CREDITS
						L:T:P:S		Duration in hours	CIE: SEE Marks	Total Marks	
1	BSC	B24MAT41E	Statistics, Probability and Complex Variables	MATHS	MATHS	3:0:0:0	48	03	50:50	100	3
2	IPCC	B24EE42	Power Electronics	EEE	EEE	3:0:2:0	48	03	50:50	100	4
3	IPCC	B24EE43	Electric Motors	EEE	EEE	3:0:2:0	48	03	50:50	100	4
4	PCC	B24EE44	Transmission and Distribution	EEE	EEE	3:0:0:0	48	03	50:50	100	3
5	ESC	B24EE45x	ESC/ETC/PLC	EEE	EEE	3:0:0:0	48	03	50:50	100	3
6	BSC	B24BOE46	Biology For Engineers	Any department	CI	1:0:0:0	16	01	50:50	100	1
7	AEC	B24EE47x	Ability Enhancement Course - IV	EEE	EEE	(If the course is a theory) 1:0:0:0	16	01	50:50	100	1
						(If the course is a Lab) 0:0:2:0					
8	UHV	B24UHK48	Universal Human Values	Any department	IS	1:0:0:0	16	--	100:0	100	1
9	PCCL	B24EEL49	Python Programming for Electrical Engineers	EEE	EEE	0:0:2:0	00	03	50:50	100	1
10	NCMC	B24NSK410	NATIONAL SERVICE SCHEME (NSS) - II	NSS Coordinator	PED	0:0:2:0	00	-	100:0	100	0
		B24PEK410	PHYSICAL EDUCATION (SPORTS & ATHLETICS)-II	Physical Education Director							

		B24YOK410	YOGA II	Yoga Teacher							
11	AC	B24SDC411	Ready to Rise	T&P	T&P	0:0:0:2	00	-	100:0	100	0
Total									700:400	1100	21

PCC: Professional Core Course, **PCCL:** Professional Core Course laboratory, **UHV:** Universal Human Value Course, **NMC** Non Credit Mandatory Course, **AEC:** Ability Enhancement Course, **SEC:** Skill Enhancement Course, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **K:** This letter in the course code indicates common to all the stream of engineering. **ESC:** Engineering Science Course, **ETC:** Emerging Technology Course, **PLC:** Programming Language Course

Engineering Science Course (ESC/ETC/PLC)			
B24EE451	Electrical Power Generation and Economics	B24EE453	Sensors and Transducers
B24EE452	Op-Amp and LIC	B24EE454	Introduction to EV Technology
Ability Enhancement Course / Skill Enhancement Course - IV			
B24EE471	Basics of VHDL Lab	B24EE473	IoT Lab
B24EE472	PCB Design using OrCAD /any other tool	B24EE474	MATLAB for Electrical and Electronic Measurements

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching- Learning hours (L: T: P: S) can be considered as (3: 0: 2:0) or (2: 2: 2:0). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B. Tech.) 2024-25

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ASSESSMENT PATTERN

Alternative Assessment Tool (AAT):

In order to encourage innovative methods while delivering a course, the faculty members have been encouraged to use the Alternative Assessment Tool (AAT). Thus AAT enables faculty to employ innovative methods and design own assessment patterns during the CIE. The AAT enhances the autonomy (freedom and flexibility) of individual faculty and enables them to create innovative pedagogical practices. If properly applied, the AAT converts the classroom into an effective learning space. **Some possible AAT are:** QUIZ / seminar/ assignments / term paper / open ended experiments / mini-projects / concept videos / partial reproduction of research work / oral presentation of research work / group activity / developing a generic tool-box for problem solving / report based on participation in create-a-thon / make-a-thon / code-a-thon / hack-a-thon conducted by reputed organizations / any other.

Table - 1: Typical distribution of weightage for CIE & SEE for Regular Theory (Non Integrated) Courses.

Assessment	Component	Marks	Reduced to	TOTAL Marks
CIE	Internals - I	40	-	40 (Average of 3 test)
	Internals - II	40	-	
	Internals - III	40	-	
	AAT - I	10	-	10 (Average)
	AAT - II	10	-	
SEE	Semester End Exam	100	50	50
TOTAL MARKS				100

Pattern of SEE Question Paper

Q. #	CONTENTS	MARKS	Reduced to	
PART A				
1	Objective type questions / 1 or 2 mark questions covering entire syllabus	15	50	
PART B				
2 & 3	Module - I : Question 1 or 2	17		
4 & 5	Module - II : Question 3 or 4	17		
6 & 7	Module - III : Question 5 or 6	17		
8 & 9	Module - IV : Question 7 or 8	17		
10 & 11	Module - V : Question 9 or 10	17		
MAXIMUM MARKS FOR SEE THEORY		100		

Table - 2: Typical distribution of weightage for CIE & SEE for Practical Courses.

Assessment	Component	Marks	Reduced to	TOTAL Marks
CIE	Lab - Continuous Internal Assessment (Weekly Performance)	30	-	50
	Internal Test	20	-	
SEE	Semester End Exam	100	50	50
TOTAL MARKS				100

Table - 3: Typical distribution of weightage for Integrated Courses.

Assessment	Component	Marks	Reduced to	TOTAL Marks
CIE	Internals - I	40	Average of all 3 tests is considered for 40	40 marks is scaled down to 30
	Internals - II	40		
	Internals - III	40		
	Lab - Continuous Internal Assessment (Weekly Performance)	10	-	20
	Internal Test	50	10	
SEE	Semester End Exam	100	50	50
TOTAL MARKS				100

Pattern of SEE Question Paper

Q. #	CONTENTS	MARKS	Reduced to
PART A			50
1	Objective type questions / 1 or 2 mark questions covering entire syllabus	15	
PART B			
2 & 3	Module - I : Question 1 or 2	17	
4 & 5	Module - II : Question 3 or 4	17	
6 & 7	Module - III : Question 5 or 6	17	
8 & 9	Module - IV : Question 7 or 8	17	
10 & 11	Module - V : Question 9 or 10	17	
MAXIMUM MARKS FOR SEE THEORY		100	

**Table - 4: Typical distribution of weightage for CIE & SEE for ONE CREDIT THEORY COURSE.
(L:T:P – 1:0:0) (AEC / SEC courses - Assessment will be Multiple Choice Questions based)**

Assessment	Component	Marks	TOTAL Marks
CIE	Internals - I	50	50 (Average)
	Internals - II	50	
SEE	Semester End Exam	50	50
TOTAL MARKS			100

Table - 5: Typical distribution of weightage for NON CREDIT COURSES / AUDIT COURSES (Only CIE)

Assessment	Component	Marks	TOTAL Marks
CIE	Internals - I	50	100
	Internals - II	50	
TOTAL MARKS			100

**Table - 6: Typical distribution of weightage for CERTIFICATION COURSES (ONE CREDIT COURSE
- provided L:T:P is 0:0:2).**

Assessment	Component	Marks	Reduced to	TOTAL Marks
CIE	Lab - Continuous Internal Assessment (Weekly Performance)	30	10	50
	Internal Lab Test	30	10	
	Proctored (Certification) Exam	100	30	
SEE	Semester End Exam	100	50	50
TOTAL MARKS				100

FOURIER SERIES, TRANSFORMS AND NUMERICAL TECHNIQUES

Course Code	B24MAT31E	Total contact hours / week	03	CIE MARKS	50
Course Category	BSC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

The goal of the course Fourier series, transforms and Numerical techniques in

1. Learn to use the Fourier series to represent periodical physical phenomena in engineering analysis.
2. To enable the students to study Infinite Fourier Transforms and concepts of infinite Fourier Sine and Cosine transforms
3. To enable the students to study the concept of z-transforms to solve the difference equations
4. To develop proficiency in solving partial differential equations arising in engineering applications, using numerical methods
5. To solve ordinary differential equations arising in engineering applications, using numerical methods and develop proficiency in calculus of variations.

PREREQUISITES

Fundamentals of trigonometry, integral calculus, differential calculus and linear algebra

MODULE	TOPICS	Hours
1	Fourier Series	
	Periodic functions, Dirichlet's condition. Fourier series of periodic functions with period 2π and arbitrary period. Half range Fourier series. Practical harmonic analysis.	9
2	Infinite Fourier Transforms	
	Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms Inverse Fourier cosine and sine transforms. Problems.	9
3	Z-Transforms	
	Z-transform-definition, Standard Z-transforms, Damping and shifting rules, Problems. Initial value theorem. Final value theorem. Inverse z-transform and applications to solve difference equations.	8
4	Numerical Solution of Partial Differential Equations	
	Classifications of second-order partial differential equations, finite difference approximations to derivatives, Solution of Laplace's equation using standard five-point formula. Solution of heat equation by Schmidt explicit formula and Crank-Nicholson method, Solution of the Wave equation. Problems.	8

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

5	Numerical Solution of Second-Order ODEs and Calculus of Variations	
	Second-order differential equations: Runge-Kutta method and Milne's predictor and corrector method. Calculus of Variations: Functionals, Euler's equation, Problems on extremals of functional. Geodesics on a plane, Variational problems	8

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	B.S.Grewal	44 th	Khanna Publishers	2021
2	Advanced Engineering Mathematics	E.Kreyszig	10 th	John Wiley & Sons	2016

REFERENCE BOOKS

Sl. No.	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	V. Ramana	11 th	McGraw-Hill Education	2017
2	Engineering Mathematics	Srimanta Pal & Subodh C.Bhunia	3 rd	Oxford University Press	2016
3	A Text book of Engineering Mathematics	N.P Bali and Manish Goyal	10 th	Laxmi Publications	2022
4	Advanced Engineering Mathematics	C.Ray Wylie , Louis C.Barret	6 th	McGraw-Hill Book Co., New York	2017
5	Engineering Mathematics for Semester I and II	Gupta C.B, Singh S.R and Mukesh Kumar	NA	Mc-GrawHill Education(In dia) Pvt. Ltd	2015

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	NPTEL	http://nptel.ac.in/courses.php?disciplineID=111
2	MOOCs	http://www.class-central.com/subject/math
3		http://academicearth.org/mathematics
4	VTU e-Shikshana Program	
5	VTU EDUSAT Program	

COURSE OUTCOMES:

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

CO #	Course Outcome Statements
CO1	Demonstrate the Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing, and field theory.
CO2	To apply Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations
CO3	To apply Z-Transform techniques to solve difference equations
CO4	Students will learn to classify PDEs, approximate derivatives using finite difference methods, and apply these techniques to solve the equations numerically.
CO5	To solve Second-order differential equations using R-K method and Milne's predictor and corrector method and on extremals of functionals, Geodesics on a plane and variational problems.

CO-PO-PSO Mapping

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

Teaching-Learning Process Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples. Support and guide the students for self-study.
3. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students progress.
4. Encourage the students to group learning to improve their creative and analytical skills.
5. Show short related video lectures in the following ways:
 - As an introduction to new topics (pre-lecture activity).
 - As a vision of topic (post-lecture activity).
 - As additional examples (post-lecture activity).
 - As an additional material of challenging topics (pre-and post-lecture activity).

As a model solution of some exercises (post-lecture activity).

ELECTRIC CIRCUIT ANALYSIS

Course Code	B24EE32	Total contact hours / week	05	CIE MARKS	50
Course Category	IPCC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:2:0	Total Notional Learning Hours	120	TOTAL MARKS	100
Total credits	04			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

1. To familiarize the basic laws, source transformations, theorems and the methods of analyzing electrical circuits.
2. To explain the use of network theorems and the concept of resonance.
3. To familiarize the analysis of three-phase circuits, two port networks and networks with non-sinusoidal inputs.
4. To explain the importance of initial conditions, their evaluation and transient analysis of R-L and R-C circuits.
5. To impart basic knowledge on network analysis using Laplace transforms.

PREREQUISITES

Elements of Electrical Engineering

MODULE #	TOPICS	Hours
1	Basic Concepts: Active and passive elements, Concept of ideal and practical sources. star – delta transformation. Analysis of networks by (i) Network reduction method including, (ii) Mesh and Node voltage methods for ac and DC circuits with independent and dependent sources. Concept of Super-Mesh and Super node analysis, Duality.	9
2	Network Theorems: Super Position theorem, Thevenin's theorem, Norton's theorem, and Maximum power transfer theorem. (Problems with independent AC and DC sources only).	8
3	Resonant Circuits: Analysis of simple series RLC and parallel RLC circuits under resonances. Problems on Resonant frequency, Bandwidth and Quality factor at resonance. Transient Analysis: Behavior of circuit elements under switching action, Evaluation of initial conditions. Transient analysis of RL and RC circuit under DC excitations.	8
4	Laplace Transformation: Laplace transformation (LT), Initial and Final value theorems. Solution of electrical circuits using LT.	8
5	Two Port Networks: Definition, Open circuit impedance, Short circuit admittance, hybrid parameters and Transmission parameters and their evaluation for simple circuits for, relationship between parameters sets (Problems on Open circuit impedance, Short circuit admittance only)	9

Practice (Laboratory) Part	
Exp No	Experiments
1	Study of the effect of Open and Short circuits in simple circuits.
2	Determination of resonant frequency, bandwidth, and Q of a series circuit.
3	Determination of resonant frequency, bandwidth, and Q of a parallel circuit.
4	Simulation and verification of Thevenin's theorem.
5	Simulation and verification of Norton's theorem.
6	Simulation and verification of Superposition theorem.
7	Simulation and verification of maximum Power transfer theorem.
8	Measurement of time constant of an RC circuit.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Engineering Circuit Analysis	William H Hayt et al	8 th	Mc Graw Hill	2014
2	Network Analysis	M.E. Vanvalkenburg	3 rd	Pearson	2014
3	Fundamentals of Electric Circuits	Charles K Alexander Matthew N O Sadiku	5 th	Mc Graw Hill	2013

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Engineering Circuit Analysis	J David Irwin et al	10 th	Wiley India	2014
2	Electric Circuits	Mahmood Nahvi	5 th	Mc Graw Hill	2009
3	Introduction to Electric Circuits	Richard C Dorf and James A Svoboda	9 th	Wiley 9 th Edition, 2015	2015
4	Circuit Analysis ; Theory and Practice	Allan H Robbins Wilhelm C Miller	5 th	Cengage	2013
5	Basic Electrical Engineering	V K Mehta, Rohit Mehta	6 th	S Chand	2015

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	NPTEL	https://onlinecourses.nptel.ac.in/noc22_ee90/preview
2	E-book	https://books.google.co.in/books?id=HC60vnSRiUsC&lpg=PR2&pg=PR2&redir_esc=y#v=onepage&q&f=false

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the basic concepts, basic laws and methods of analysis of DC and AC networks and reduce the complexity of network using source shifting, source transformation and network reduction using transformations.
CO2	Solve complex electric circuits using network theorems.
CO3	Discuss resonance in series and parallel circuits and also the importance of initial conditions and their evaluation.
CO4	Synthesize typical waveforms using Laplace transformation.
CO5	Evaluate the performance of two port networks and their relationship

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	1	-	2	-	-	-	-	-	-	3	1	-
CO3	3	3	1	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	1	-	-	-	-	-	-	-	-	2	-	-
CO5	3	3	1	-	2	-	-	-	-	-	-	2	-	-
AVG	3	3	1	-	2	-	-	-	-	-	-	2.6	1	-

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

TRANSFORMERS AND GENERATORS

Course Code	B24EE33	Total contact hours / week	05	CIE MARKS	50
Course Category	IPCC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:2:0	Total Notional Learning Hours	120	TOTAL MARKS	100
Total credits	04			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

<ol style="list-style-type: none"> 1. To understand the construction, working and various tests of single-phase Transformer. 2. To understand the construction, working and parallel operation of three phase Transformer. 3. To understand the construction, working and analysis of Synchronous Generator. 4. To understand the construction, working of solar and wind power generators. 5. To conduct various tests on transformers and synchronous machines and evaluate their performance. 6. To calculate the voltage regulation of an alternator.

PREREQUISITES

Strong foundation in basic electrical circuits and magnetic circuits, understanding of Electromagnetism

MODULE #	TOPICS	Hours
1	<p>Single phase Transformers: Necessity of transformer, principle of operation, Types and construction, EMF equation, equivalent circuit, Operation of practical transformer under no-load and on-load with phasor diagrams. Losses and methods of reducing losses, efficiency and condition for maximum efficiency. Polarity test, Sumpner's test. Open circuit and Short circuit tests, calculation of equivalent circuit parameters. Predetermination of efficiency, voltage regulation and its significance. Numerical.</p>	8
2	<p>Three-phase Transformers: Introduction, Constructional features of three-phase transformers. Transformer connection for three phase operation- star/star, delta/delta and star/delta, comparative features. Labelling of three-phase transformer terminals.</p> <p>Parallel Operation of Transformers: Necessity of Parallel operation, conditions for parallel operation- Single phase and three phase. Load sharing in case of similar and dissimilar transformers. Numerical.</p> <p>Auto transformers and Tap changing transformers: Introduction to autotransformer-copper economy, equivalent circuit, no load and on load tap changing transformers. Numerical.</p>	9
3	<p>Synchronous Generators: Construction, working, Armature windings, winding factors, EMF equation. Harmonics-causes, reduction and elimination. Armature reaction, Synchronous reactance, Equivalent circuit.</p>	8

4	<p>Synchronous Generators Analysis (Salient Pole): Effects of saliency, two-reaction theory, Parallel operation of generators and load sharing. Methods of Synchronization. Open circuit and short circuit characteristics, Voltage regulation. Assessment of reactance-short circuit ratio, Alternator on load. Voltage regulation. Voltage regulation by EMF and MMF methods. Excitation control for constant terminal voltage, Numerical</p>	9
5	<p>Wind power Generator – Basic components of wind energy conversion system, types of wind generators- Horizontal and vertical axis. Site selection for wind turbine installations, Site selection for wind turbine installations. Advantages and disadvantages of WECS.</p> <p>Solar power generator - principle of solar cell, Basic Solar Photo voltaic, system for power generation, Solar Collectors and their types (Flat plate and concentrating type), V-I Characteristics of Solar Cells, Applications of Solar cells, Solar Collectors and their types (Flat plate and concentrating type), V-I Characteristics of Solar Cells, Applications of Solar cells, Advantages and disadvantages.</p>	8

Practice (Laboratory) Part

Exp. No	Experiments
1	Open Circuit and Short circuit tests on single phase step up or stepdown transformer and pre- determination of (i) Efficiency and regulation (ii) Calculation of parameters for equivalent circuit.
2	Sumpner's test on similar transformers and determination of combined and individual transformer efficiency.
3	Parallel operation of two dissimilar single-phase transformers of different kVA and determination of load.
4	Polarity test and connection of 3 single-phase transformers in star – delta and determination of efficiency and regulation under balanced resistive load.
5	Separation of hysteresis and eddy current losses in single phase transformer.
6	Voltage regulation of an alternator by EMF method
7	Model transformer in Simscape tool for Automatic Voltage Regulation.
8	Model the experiment setup for open circuit and short circuit tests to determine circuit parameters using Simulink tool.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Electric Machines	D. P. Kothari	4 th	Tata Mc Graw Hill	2011
2	Electric Machines	Ashfaq Hussain, Dhanpat Rai & Co	2 nd	Dhanpat Rai &Co	2013
3	Non-conventional Energy sources	G.D Rai	6 th	Khanna publisher	2017

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Electric Machines	Mulukuntla S. Sarma, et al	1 st	Cengage,	2009
2	Electrical Machines Drives and Power systems	Theodore Wildi	6 th	Pearson	2014
3	Principals of Electrical Machines	V.K Mehta, Rohit Mehta	2 nd	S Chand	2009

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Web links and Video Lectures	https://onlinecourses.nptel.ac.in/noc25_ee124/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain the construction, working and various tests of single-phase Transformer.
CO2	Explain the construction, working and parallel operation of three phase Transformer.
CO3	Explain the construction, working and analysis of Synchronous Generator.
CO4	Explain the construction, working of solar and wind power generators.
CO5	Conduct various tests on transformers and synchronous machines and perform the parallel operation on two single phase transformers.
CO6	Verify the performance of synchronous generator and calculate the voltage regulation of an alternator.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	1	1	-	-	-	1	3	-	-
CO2	3	2	-	-	-	1	1	-	-	-	1	3	-	-
CO3	3	3	-	-	-	1	1	-	-	-	1	3	-	-
CO4	3	3	-	-	-	1	1	-	-	-	1	3	-	-
CO5	3	3	1	1	1	1	1	-	-	-	1	3	-	-
CO6	3	3	1	1	1	-	-	-	-	-	1	3	3	-
AVG	3	2.6	1	1	1	1	1	-	-	-	1	3	3	-

Teaching-Learning Process

Pedagogy (General Instructions):

1. These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.
2. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
3. Use of Video/Animation to explain functioning of various concepts.
4. Encourage collaborative (Group Learning) Learning in the class.
5. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
7. Introduce Topics in manifold representations.
8. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.

ANALOG ELECTRONIC CIRCUITS

Course Code	B24EE34	Total contact hours / week	03	CIE MARKS	50
Course Category	PCC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

1. To provide the knowledge for the analysis of Diode clipping clamping circuits, transistor biasing and thermal stability circuits.
2. To develop skills to design the electronic circuits like amplifiers, power amplifiers and oscillators.
3. To understand the importance of FET and MOSFET and FET/MOSFET amplifiers

PREREQUISITES

Basic Electrical Engineering and Basic Electronics Engineering.

MODULE #	TOPICS	Hours
1	Diode Circuits Diode clipping and clamping circuits. Transistor Biasing and Stabilization The operating point, load line analysis, DC analysis and design of fixed bias circuit, emitter stabilized bias circuit, and collector to base bias circuit, voltage divider bias circuit, modified DC bias with voltage feedback. Bias stabilization and stability factors for fixed bias circuit, collector to base bias circuit and voltage divider bias circuit, bias compensation, Transistor switching circuits	9
2	Transistor at Low Frequencies: Hybrid model, h-parameters for CE, CC and CB modes, mid-band analysis of single stage amplifier, simplified hybrid model, analysis for CE, CB and CC(emitter voltage follower circuit) modes, Millers Theorem .	9
3	Multistage amplifiers: Cascade connection, analysis for CE-CC mode, CE-CE mode, CASCODE connections, Darlington connection using h-parameter model. Feedback Amplifiers: Classification of feedback amplifiers, concept of feedback, general characteristics of negative feedback amplifiers, Input and output resistance with feedback of various feedback amplifiers, analysis of different practical feedback amplifier circuits.	8
4	Power Amplifiers: Classification of power amplifiers, Analysis of class A, Class B, class C and Class AB amplifiers, Distortion in power amplifiers, second harmonic distortion, harmonic distortion in Class B amplifiers, cross over distortion and elimination of cross over distortion. Oscillators: Concept of positive feedback, frequency of oscillation for RC phase oscillator, Wien Bridge oscillator, Tuned oscillator circuit, Hartley oscillator, Colpitt's oscillator, crystal oscillator and its types	8

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

5	FETs: Construction, working and characteristics of JFET and MOSFET (enhance and Depletion type) Biasing of JFET and MOSFET. Fixed bias configuration, self-bias configuration, voltage divider biasing. Analysis and design of JFET (only common source configuration with fixed bias) and MOSFET amplifiers.	8
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PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Electronic Devices and Circuits	Millman and Halkias	4th	Mc Graw Hill	2015
2	Electronic Devices and Circuit Theory	Robert L Boylestad Louis Nashelsky	11th	Pearson	2015
3	Electronic Devices and Circuits	David A Bell	5th	Oxford University Press	2008

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Microelectronics Circuits Analysis and Design	Muhammad Rashid	2nd	Cengage Learning	2014
2	A Textbook of Electrical Technology, Electronic Devices and Circuits	B.L. Theraja, A.K. Theraja	25 th	S. Chand	Reprint, 2013
3	Electronic Devices and Circuits	Anil K. Maini, Vasha Agarval	1st	Wiley	2009
4	Electronic Devices and Circuits	S. Salivahanan, Suresh	3rd	Mc Graw Hill	2013
5	Fundamentals of Analog Circuits	Thomas L Floyd	2nd	Pearson	2012

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	NPTTEL	https://onlinecourses.nptel.ac.in/noc25_ee103
2	TEXAS INSTRUMENTS	https://www.ti.com/design-resources/design-tools-simulation/analog-circuits/overview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Obtain the output characteristics of clipper and clamper circuits.
CO2	Design and compare biasing circuits for transistor amplifiers & explain the transistor switching.
CO3	Explain the concept of feedback, its types and design of feedback circuits.
CO4	Design and analyse the power amplifier circuits and oscillators for different frequencies.
CO5	Design and analysis of FET and MOSFET amplifiers.

CO-PO-PSO Mapping

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

Teaching-Learning Process

Pedagogy (General Instructions):

1. These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
2. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
3. Use of Video/Animation to explain functioning of various concepts.
4. Encourage collaborative (Group Learning) Learning in the class.
5. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
7. Introduce Topics in manifold representations.
8. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.

DIGITAL LOGIC CIRCUITS

Course Code	B24EE351	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

1. To illustrate simplification of algebraic equations using Karnaugh Maps and Quine-McCluskey methods.
2. To design decoders, encoders, digital multiplexer, adders, sub tractors and binary comparators
3. To explain latches and flip-flops, registers and counters
4. To analyse Mealy and Moore Models
5. To develop state diagrams synchronous sequential circuits
6. To understand the applications of sequential circuits and basics of VHDL.

PREREQUISITES

Number system, Boolean Algebra. C programming

MODULE #	TOPICS	Hours
1	Principles of Combinational Logic: Definition of combinational logic, canonical forms, Generation of switching equations from truth tables, Karnaugh maps-3,4,5 variables, Incompletely specified functions (Don't care terms) Simplifying Max term equations, Quine-McCluskey minimization technique, Quine McCluskey using don't care terms, Reduced prime implicants' Tables with 4 & 5 variables.	9
2	Analysis and Design of Combinational logic: General approach to combinational logic design, Decoders, BCD decoders, Encoders, digital multiplexers, Using multiplexers as Boolean function Generators one bit Adders and subtractors Parallel Adders and subtractors. Binary comparators	9
3	Flip-Flops: Basic Bi-stable elements, Latches, Timing considerations, The master-slave flip-flops (pulse triggered flip-flops): SR flip-flop JK flip-flops, Edge triggered flip- flops, Characteristic equations.	8
4	Flip-Flops Applications: Registers, binary ripple counters, synchronous binary counters, Counters based on shift registers, Design of a synchronous counter, Design of a synchronous mod-n counter using Clocked T and D flip-flops, Memories.	8
5	Sequential Circuit Design: Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, counter design, Basics of Verilog HDL.	8

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Digital logic applications and design	John M Yarbrough	2nd	Thomson Learning	2001
2	Digital Principles and design,	Donald D Givone	2nd	MC Graw Hill	2002
3	Fundamentals of logic design	Charles H Roth Jr, Larry L Kinney	7th	Cengage Learning	2003

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Digital circuits and design	D.P.Kothari and J S Dhillon	3rd	Pearson	2016
2	Digital Design	Morris Mano	3rd	PHI	2009
3	Electronics Lab Manual	K.A. Navas	5th	PHI	2015

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	YouTube videos on digital electronics	https://onlinecourses.nptel.ac.in/noc20_ee32/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	To illustrate simplification of algebraic equations using Karnaugh Maps and Quine-McClusky methods
CO2	To design decoders, encoders, digital multiplexer, adders, subtractors and binary comparators
CO3	To analyse behaviours of flip-flops, registers, counters and memories.
CO4	To illustrate Verilog description of basics of combinational and sequential circuits.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	-	1	-	-	-	-	-	1	2	1	-
CO2	3	3	-	-	1	-	-	-	-	-	1	2	1	-
CO3	3	3	-	-	1	-	-	-	-	-	1	2	1	-
CO4	3	3	-	-	2	-	-	-	-	-	1	2	1	-
AVG	3	3	-	-	1.25	-	-	-	-	-	1	2	1	-

Teaching-Learning Process

Pedagogy (General Instructions):

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.

INTRODUCTION TO EARTHING PRACTICES

Course Code	B24EE352	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

1. Understand the key terms and concepts related to electrical safety and grounding systems.
2. Understand the principles, necessity, and methods of electrical earthing systems and earth electrodes.
3. Understand the fundamental objectives and classifications of electrical system earthing
4. Perform essential measurements and calculations related to electrical earthing systems to ensure system safety and compliance.
5. Understand and apply earthing practices specific to power stations and substations

PREREQUISITES

Basics of Electrical Engineering

MODULE #	TOPICS	Hours
1	Basic Definitions and Nomenclature: Basic Insulation, Class 0 Equipment, Class-I Equipment, Class-II Equipment, Class-III Equipment, Direct Contact, Indirect Contact, Disconnection of Supply, Exposed-Conductive-Part (ECP), Extra-Low Voltage, Exposed-Conductive-Part (EXCP), Functional Insulation, Ground, IT Grounding System, Neutral-Protective Conductor (PEN), Protective Bonding Conductor, Protective Conductor (PE), Remote or Zero Potential, Prospective Touch Voltage, Touch Voltage, Prospective Step Voltage, Step Voltage	9
2	Introduction to Earthing & Earth Electrodes: Definition and Necessity of earthing, Factors influencing the choice of earthed or unearthed system, Soil Resistivity, Types of earthing: Plate earthing, Pipe earthing, rod earthing, Strip earthing and Earthing using earth electrode, Difference between earthing, grounding and neutral.	8
3	Earthing System: System earthing: Basic objectives, Types of Earthing System: TT Earthing System, TN Earthing System, IT Earthing System,	8
4	Measurements and Calculations: Measurement of Earth Resistivity, Measurement of Earth Electrode Resistance, Measurement of Earth Loop Impedance, Calculation of Earth Fault Currents.	8
5	Earthing in Power stations and Substations: Introduction, General earthing arrangement, General earthing arrangement at power stations of public electricity supplies, Equipment earthing at power stations, Power station and substation earth electrodes, Earthing conductors for power stations and substations, Earthing of high voltage cable sheaths.	9

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Electrical Safety of Low-Voltage Systems	Dr. Massimo A. G. Mitolo	NA	McGraw-Hill Companies, Inc	2009

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Earthing systems and Protection in low voltage installations	Center for advanced maintenance Technology	Vol.1	Indian Railways	2021
2	CODE of Practice for Earthing	NA	NA	IS:3043	2018

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Online Course materials	https://www.accessengineeringlibrary.com/content/book/9780070620988/chapter/chapter1

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Realize the basic terms involved in Earthing Practices
CO2	Identify different types of Earthing
CO3	Distinguish between different types of system earthing.
CO4	Determine the earth parameters.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	2	-	-	-	-	2	-	-	-	-	1	2	-	1
C02	2	-	-	-	-	2	-	-	-	-	1	2	-	1
C03	2	-	-	-	-	2	-	-	-	-	1	2	-	1
C04	2	-	-	-	-	2	-	-	-	-	1	2	-	1
AVG	2	-	-	-	-	2	-	-	-	-	1	2	-	1

Teaching-Learning Process

Pedagogy (General Instructions):

1. Lecture method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.

ELECTROMAGNETIC FIELDS

Course Code	B24EE353	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

<ol style="list-style-type: none"> 1. To understand Scalars, Vectors, Cartesian co-ordinate system, relation between different coordinate systems, Coulomb's law, Electric field intensity and its evaluation for different charge conditions. 2. To understand potential field of a point charge, Potential gradient, Energy density in the electrostatic field and conductor's properties and boundary conditions. 3. To understand Poisson's and Laplace Equations, Biot - Savart's law, Ampere's circuital law and Stokes theorem. 4. To understand Magnetic force, Force between differential current elements. Force and torque on a closed circuit, Nature of magnetic materials and Magnetic boundary conditions. 5. To understand Faraday's law, Displacement current. Maxwell's equations, Wave propagation in free space and in dielectrics.
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PREREQUISITES

Vector calculus, Electrostatics and Electromagnetism,

MODULE #	TOPICS	Hours
1	<p>Vector Analysis: Scalars and Vectors, Vector algebra, Cartesian co-ordinate system, Vector Components and unit vectors. Scalar field and Vector field. Dot product and Cross product, Gradient of a scalar field. Divergence and Curl of a vector field. Co-ordinate systems: cylindrical and spherical, relation between different coordinate systems. Expression for gradient, divergence and curl in rectangular, cylindrical and spherical co-ordinate systems. Numerical.</p> <p>Electrostatics: Coulomb's law, Electric field intensity and its evaluation for (i) point charge (ii) line charge (iii) surface charge (iv) volume charge distributions. Electric flux density, Gauss law and its applications. Maxwell's first equation (Electrostatics). Divergence theorem. Numerical.</p>	9
2	<p>Energy and Potential: Energy expended in moving a point charge in an electric field. The line integral. Definition of potential difference and potential. The potential field of a point charge and of a system of charges. Potential gradient. The dipole. Energy density in the electrostatic field. Numerical.</p> <p>Conductor and Dielectrics: Current and current density. Continuity of current. Metallic conductors, conductor's properties and boundary conditions. Perfect dielectric materials,</p>	9

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	capacitance calculations. Parallel plate capacitor with two dielectrics with dielectric interface parallel to the conducting plates. Numerical.	
3	Poisson's and Laplace Equations: Derivations and problems, Uniqueness theorem. Steady magnetic fields: Biot - Savart's law, Ampere's circuital law. The Curl. Stokes theorem. Magnetic flux and flux density. Scalar and vector magnetic potentials. Numerical.	8
4	Magnetic forces: Force on a moving charge and differential current element. Force between differential current elements. Force and torque on a closed circuit. Numerical. Magnetic Materials and Magnetism: Nature of magnetic materials, magnetisation and permeability. Magnetic boundary conditions. Magnetic circuit, inductance and mutual inductance. Numerical.	8
5	Time Varying Fields and Maxwell's Equations: Faraday's law, Displacement current. Maxwell's equations in point form and integral form. Numerical. Uniform plane wave: Electromagnetic radiation: near field—non-radiative and radiative, far field. Wave propagation in free space and in dielectrics. Pointing vector and power considerations. Propagation in good conductors, skin effect. Numerical.	8

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Engineering Electromagnetics	William H Hayt	8 th	McGraw Hill	2014
2	Principles of Electromagnetics	Matthew N. O. Sadiku	6 th	Oxford	2015

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Engineering Electromagnetics	David K. Cheng	1 st	Pearson	2014
2	Electromagnetic Field Theory	Rohit Khurana	1 st	Vikas Publishing	2014
3	Electromagnetics	J. A. Edminister	3 rd	McGraw Hill	2010

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	YouTube video	https://www.youtube.com/@VTUeShikshanaProgramme
2	NPTEL Course	https://onlinecourses.nptel.ac.in/noc21_ee83/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain Scalars, Vectors, Cartesian co-ordinate system, relation between different coordinate systems, Coulomb's law, Electric field intensity and its evaluation for different charge conditions.
CO2	Explain the potential field of a point charge, Potential gradient, Energy density in the electrostatic field and conductor's properties and boundary conditions.
CO3	Explain the Poisson's and Laplace Equations, Biot - Savart's law, Ampere's circuital law and Stokes theorem.
CO4	Explain the Magnetic force, Force between differential current elements. Force and torque on a closed circuit, Nature of magnetic materials and Magnetic boundary conditions.
CO5	Explain the Faraday's law, Displacement current. Maxwell's equations, Wave propagation in free space and in dielectrics.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	2	-	-	-	-	-	-	-	3	-	-
AVG	3	3	-	2	-	-	-	-	-	-	-	3	-	-

Teaching-Learning Process

Pedagogy (General Instructions):

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.

ELECTRICAL SAFETY

Course Code	B24EE354	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	03 hours

COURSE LEARNING OBJECTIVES

1. Understand the Fundamental Principles of Electrical Hazards
2. Recognize and Assess Electrical Risks
3. Apply Electrical Safety Standards and Regulations
4. Foster a Culture of Electrical Safety

PREREQUISITES

Basic Physics and Electrical Concepts, General Safety Principles and Contextual Awareness

MODULE #	TOPICS	Hours
1	GLOSSARY: Accident, Hazard, Arc (electric), Arc energy input, Arc incident energy, Arc-flash, Arc-resistant switchgear, Blast (electric), Contractor muscle, Electrocution, Extensor muscle, Fibrillation, Flash, Horny layer, Plasma, Shock circuit, Shock (electric), Flame retardant. Ampacity, amperage, arc-blast, arcing, AWG, bonding, bonding jumper, CPR, de-energize, double-insulated, energized, fault current, fixed wiring, flexible wiring, fuse, GFCI, ground, ground fault, ground potential, guarding, insulation, leakage current NEC neutral, ohm, OSHA, PPE, risk, shocking current, Lock-out, tag-out, trip	8
2	HAZARD: Introduction, Hazard analysis, Shock: Description, Influencing factors. Arc: Definition and description, arcing voltage, arc burns. Blast, affected body parts.	8
3	ELECTRICAL SAFETY PROCEDURES: Six step safety method, Pre-Job Briefings, Energized or De-Energized, Safe Switching of Power Systems, Lockout-Tagout, Placement of Safety Grounds, Tools and Test Equipment, The One-Minute Safety Audit.	9
4	SAFETY SYMBOLS: Introduction to safety signs, Prohibition signs, Mandatory signs, Warning signs, Fire signs and Information signs. Applications of Electrical Safety in Special Locations and Installations: Introduction, Electrical Safety in Train Stations, Electrical Safety in Swimming Pools, Electrical Safety in Restrictive Conductive Locations, Electrical Safety in External Lighting Installations, Electrical Safety in Medical Locations.	8

5	ELECTRICAL SAFETY STANDARDS AND REGULATIONS IN INDIA: The Electricity Act, 2003, Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010, Indian Standards (IS Codes), National Electrical Code of India (NEC), SP 30 (latest edition, e.g., SP 30:2023), IS 732: Code of Practice for Electrical Wiring Installations (latest edition, e.g., IS 732:2019)	9
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PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Electrical safety hand book	John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel	2nd	McGraw Hill Inc., New Delhi	2000

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Electrical Safety of Low-Voltage Systems	Dr. Massimo A. G. Mitolo	1st	McGraw-Hill Companies, Inc.	2009

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. No #	Type of E-Resource	URL
1	Electrical-Fire-Safety-Handbook	https://cea.nic.in/wp-content/uploads/cei/2024/03/Sachet_Booklet_English.pdf
2	National Electrical Code of India (NEC) : SP 30 : 2023:	https://archive.org/details/gov.in.is.sp.30.2023
3	IS 732 (1989): Code of Practice for Electrical Wiring Installations	https://law.resource.org/pub/in/bis/S05/is.732.1989.pdf
4	Link for Electrical safety animation	https://www.youtube.com/watch?v=yAz9Ungv2Xc
5	Link for CPR	https://www.youtube.com/watch?v=ozzZVQQTvo4
6	Link for Electrical safety basics	https://www.youtube.com/watch?v=KhWIMqyPn5A
7	Link for Electrical safety	https://www.youtube.com/watch?v=NU4k8KUD2ho
8	Link for Electrical safety procedure	https://www.youtube.com/watch?v=CpHbDOHnoKA
9	Link for Electrical safety signs	https://www.youtube.com/watch?v=XdGvTTcDie4

10	Link for Electrical accident in Swimming pool	https://www.youtube.com/watch?v=eGUe03-gTtY
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COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Realize the basic terms involved in Electrical safety
CO2	Analyse the Electrical Hazards
CO3	Explain the Electrical safety procedures
CO4	Recognize the Electrical safety signs
CO5	Differentiate the Electrical Safety in Special Locations and Installations

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
CO1	2	-	-	-	-	2	-	-	-	1	-	1	-	1
CO2	2	-	-	-	-	2	-	-	-	1	-	1	-	1
CO3	2	-	-	-	-	2	-	-	-	1	-	1	-	1
CO4	2	-	-	-	-	2	-	-	-	1	-	1	-	1
CO5	2	-	-	-	-	2	-	-	-	1	-	1	-	1
AVG	2	-	-	-	-	2	-	-	-	1	-	1	-	1

Teaching-Learning Process

Pedagogy (General Instructions):

Power Point Presentation & Chalk and Talk

SOCIAL CONNECT AND RESPONSIBILITY

Course Code	B24SCK36	Total contact hours / week	02	CIE MARKS	100
Course Category	UHV	Total SAAE hours / semester	00	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	-

COURSE LEARNING OBJECTIVES

1. Provide a formal platform for students to communicate and connect to the surrounding.
2. Create a responsible connection with the society.
3. Understand the community in general in which they work.
4. Identify the needs and problems of the community and involve them in problem –solving.
5. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

PREREQUISITES

NIL

MODULE #	TOPICS	Hours
1	Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of BE / B.Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature - - Objectives, Visit, case study, report, outcomes.	03
2	Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms - - Objectives, Visit, case study, report, outcomes.	03
3	Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus - Objectives, Visit, case study, report, outcomes.	03
4	Water conservation: Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices - Objectives, Visit, case study, report, outcomes.	03
5	Food walk: City's culinary practices, food lore, and indigenous materials of the region used in cooking - Objectives, Visit, case study, report, outcomes.	03

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
NOT APPLICABLE					

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
NOT APPLICABLE					

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	e-Book	https://www.intechopen.com/books/6630
2	e-Book	https://www.amazon.in/Social-Responsibility-Sustainability-Multidisciplinary-Perspectives-ebook/dp/B015YFJ9FW
3	Online course	https://www.coursera.org/courses?query=social%20responsibility
4	Online course	https://onlinecourses.nptel.ac.in/noc24_mg86/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Communicate and connect to the surrounding.
CO2	Create a responsible connection with the society.
CO3	Involve in the community in general in which they work.
CO4	Notice the needs and problems of the community and involve them in problem –solving.
CO5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
CO6	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO4	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO5	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Teaching-Learning Process Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- 1) In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
- 2) State the need for activities and its present relevance in the society and Provide real-life examples.
- 3) Support and guide the students for self-planned activities.
- 4) You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- 5) Encourage the students for group work to improve their creative and analytical skills

PEDAGOGY: The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

Pedagogy – Guidelines: It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Module	Topic	Content	Group Size	Location	Magnitude	Activity	Reporting
1	Plantation and adoption of a tree	Plantation of a tree that will be adopted for four years by a group of B.Tech. students. They will also make an excerpt either as a documentary or a photoblog describing the plant's origin, its usage in daily life, and its appearance in folklore and literature.	03 – 05	Farmers Land or Road side or Community area or institution's campus, any one location to be selected.	One Students must monitor it for three years	Site selection Select suitable species in consultation with horticulture, forest or agriculture department. Interact with NGO / Industry and community to plant Tag the plant for continuous monitoring	Report shall be handwritten or blog with paintings, sketches, poster, video and/or photograph with Geo tag.
2	Heritage walk and crafts corner	Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photoblog and documentary on evolution and practice of various craft forms.	03 – 05	Preferably Within the city where institution is located or home town of the student group	One or two One can be a structure or a heritage building the other can be heritage custom or practise	Survey in the form of questioner by connecting to the people and asking. No standard questioner to be given by faculty and has to be evolved involving students. Questions during survey can be asked in local language but report language is English.	
3	Waste management	Wet waste management in neighbouring villages, and	03 - 05	Preferably in the nearby villages and	One	Report on importance and benefits of Waste	

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

		implementation in the campus.	More than one group can be assigned one task based on magnitude of task.	within the campus.		management. Report on segregation, collection, transportation and disposal. Suggestion for composting. Visit nearby village/location to sensitize farmers and public about waste management and also document current practises.	Report shall be handwritten or blog with paintings, sketches, poster, video and/or photograph with Geo tag.
4	Organic farming	Usefulness of organic farming in neighbouring villages, and implementation in the campus.	03 – 05	Visit to farming lands where organic farming is going on Campus Garden Roof top Garden or Vertical Garden or hydroponics if land is scarce.	One	Collect data on organic farming in the vicinity. Like types of crop, methodology etc.. Suggestion for implementation at selected locations	
5	Food Walk	City's culinary practices, food lore, and indigenous materials of the region used in cooking.	03 – 05	Within the city where institution is located Food culture of student's resident region	One	Survey local food centres and identify the speciality Identify and study the food ingredients Report on the regional foods Report on Medicinals values of the local food	

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

						grains, and plants.	
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Assessment Details (only CIE):

After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period. The report should be signed by the mentor. The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50. Planning and scheduling the social connect Information / Data collected during the social connect Analysis of the information / data and report writing Considering all above points allotting the marks as mentioned below

- i) Excellent: 80 to 100
- ii) Good: 60 to 79
- iii) Satisfactory: 40 to 59
- iv) Unsatisfactory and fail : <39

Plan of Action (Execution of Activities)

SL. #	Practice Session Description
1	Lecture session in field to start activities
2	Students Presentation on Ideas
3	Commencement of activity and its progress
4	Execution of Activity
5	Execution of Activity
6	Execution of Activity
7	Execution of Activity
8	Case study based Assessment, Individual performance
9	Sector/ Team wise study and its consolidation
10	Video based seminar for 10 minutes by each student At the end of semester with Report.

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

Assessment Details for CIE

Weightage	CIE – 100%	<ul style="list-style-type: none"> • Implementation strategies of the project (NSS work). • The last report should be signed by NSS Officer, the HOD and Principal. • At last report should be
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study based Assessment Individual performance with report	20 Marks	

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

Sector wise study & its consolidation 5*5 = 25	25 Marks	evaluated by the NSS officer of the institute. • Finally the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.
Video based seminar for 10 minutes by each student At the end of semester with Report. Activities 1 to 5, 5*5 = 25	25 Marks	
Total marks for the course in each semester	100 Marks	

For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.

Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.

DIGITAL ELECTRONICS LAB

Course Code	B24EE371	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Analyze and Design Combinational Logic Circuits
2. Analyze and Design Sequential Logic Circuits
3. Utilize Digital ICs and Data Sheets
4. Apply Digital Logic Principles to Problem Solving

PREREQUISITES

Basic Electronics Fundamentals, Digital Logic Theory, Proficiency with Basic Lab Equipment and Logical reasoning and Cognitive/Analytical abilities

Exp. No.	TOPICS	Hours
1	Simplification, realization of Boolean expressions using logic gates/ Universal gates.	4
2	Realization of Half/Full adder and Half/Full Subtractors using logic gates.	4
3	Realization of parallel adder/Subtractors using 7483 chip.	2
4	Realization of Binary to Gray code conversion and vice versa.	2
5	Verify truth tables of flip -flops: RS, JK, T & D.	2
6	Design and testing Ring counter/Johnson counter.	2
7	Design and testing of Sequence generator.	2
8	Realization of 3 bit counters as a sequential circuit and MOD – N counter design using 7476.	6
9	Realization of 3 bit counters as a sequential circuit and MOD – N counter design using 7490.	2
10	Realization of 3 bit counters as a sequential circuit and MOD – N counter design using 74192.	2

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Digital logic applications and design	John M Yarbrough	1 st	Thomson Learning	2006

2	Digital Principles and design	Donald D Givone	1 st	MC Graw Hill	2017
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REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of logic design	Charles H Roth Jr, Larry L Kinney	7 th	Cengage Learning	2013

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Component Datasheets & Manufacturers' Resources	https://www.nxp.com/ https://www.ti.com/ https://www.alldatasheet.com/
2	Digital Electronics and Logic Design Tutorials	https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

COURSE OUTCOMES:

At the end of the Course, student will be able:

CO #	Course Outcome Statement
CO1	To design, simplify, and realize Combinational Logic Circuits
CO2	To effectively utilize industry-standard MSI chips (e.g., 74LS83, 74LS76, 74LS90, 74LS192) to implement parallel adders/subtractors and configure various MOD-N counters
CO3	To construct and experimentally verify the logic operation and truth tables of basic flip-flops (RS, JK, T & D), and design and test fundamental sequential circuits including 3-bit counters, ring counters, and Johnson counters.
CO4	To design and realize combinational logic circuits for specific code conversions.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	-	1	-	-	3	-	-
CO2	3	2	1	-	-	-	-	-	1	-	-	2	-	-
CO3	3	2	1	-	-	-	-	-	1	-	-	2	-	-
CO4	3	2	1	-	-	-	-	-	1	-	-	2	-	-
AVG	3	2	1	-	-	-	-	-	1	-	-	2.25	-	-

Teaching-Learning Process

Pedagogy (General Instructions): Hands-on, Guided Practice, Active Learning, Real-World Context and Q&A Sessions

C++ PROGRAMMING LAB

Course Code	B24EE372	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Creating simple programs using Procedural constructs.
2. Implement Object Oriented Programming Concepts in C++.
3. Develop applications using Methods and operator overloading.
4. Implement simple applications using inbuilt and user defined methods.
5. Implement Object Oriented Programs using Inheritance.

PREREQUISITES

Programming in C

Exp. No.	Programs	Hours
1	Write a C++ program to generate prime numbers between 50 to 100.	2
2	Write a C++ program to generate factorial of numbers from 1 to 10 and first n terms of the Fibonacci sequence.	4
3	Write a C++ program to check entered number is Armstrong / Perfect/ Happy number or not.	2
4	Write a C++ program to reverse a number and also check enter number is palindrome number or not.	2
5	Write a C++ program to search particular number in an array.	2
6	Write a C++ program to sort the number using bubble sort method.	4
7	Write a C++ program to add/subtract/multiply NXN matrix using functions.	4
8	Write a C++ program to design three classes student, exam and result. The student has data members such as roll no, name. Create the class exam by inheriting the student class. The exam class adds data members representing the marks scored in 5 subjects. Derive the result from exam-class and it has own data members like total, avg. write the interactive program into model this relationship.	4
9	Define a class string and overload == to compare two strings and + operator for concatenation of two strings using operator overloading concept.	4
10	Write a C++ program to compute area of right-angle triangle, equilateral triangle, isosceles triangle using function overloading concept.	2

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Programming with ANSI C++	Bhushan Trivedi	2	Oxford Press	2012
2	Object Oriented Programming with C++	Balagurusamy E	4	Tata McGraw Hill Education Pvt. Ltd	2010

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Let Us C++	Yaswaanath Kanitkar	2	BPB	2020
2	Complete Reference C++	Herbert Schildt	4	Privilege Publisher & Distributor	2017

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Basics of C++	https://www.youtube.com/watch?v=BCIS40yzsSA
2	Functions of C++	https://www.youtube.com/watch?v=p8ehAjZWjPw

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand and design the solution to a problem using object-oriented programming concepts using loops, Decision making statements.
CO2	To write and execute programs in C++ using Class, objects, Encapsulation, library methods and User-defined methods.
CO3	To write and execute programs in C++ using operator and function Overloading.
CO4	To write and execute programs in C++ using Inheritance.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	3	-	-	-	-	-	2	3	2	-
CO2	3	2	-	-	3	-	-	-	-	-	2	3	2	-
CO3	3	2	-	-	3	-	-	-	-	-	2	3	2	-
CO4	3	2	-	-	3	-	-	-	-	-	2	3	2	-
AVG	3	2	-	-	3	-	-	-	-	-	2	3	2	-

Teaching-Learning Process

Pedagogy (General Instructions): Hands-on, Guided Practice, Active Learning, Real-World Context and Q&A Sessions

INTRODUCTION TO MATLAB AND SIMULINK

Course Code	B24EE373	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Understand the MATLAB environment and perform basic programming tasks including script writing, data handling, and plotting relevant to electrical engineering applications.
2. Use MATLAB functions and control structures to analyze and solve simple numerical and engineering problems.
3. Develop and interpret 2D/3D plots and visualizations for electrical signals, system responses, and experimental data.
4. Navigate and utilize the Simulink graphical modelling environment for simulating linear and nonlinear electrical circuits.
5. Model, simulate, and analyze basic electrical systems using Simulink blocks.
6. Integrate learned tools to simulate and test simple power electronics converters and control algorithms using MATLAB and Simulink.
7. Develop problem-solving and technical report-writing skills through simulation-based experimentation and result interpretation.

PREREQUISITES

1. Basic Knowledge of Electrical & Electronics Engineering.
2. Onramp courses on Basics of MATLAB / Simulink.

Exp. No.	Experiments	Hours
1	Perform Basic Math Operations and Matrix Manipulations in MATLAB.	2
2	Plot and visualize Sinusoidal and Exponentially Decaying Signals using MATLAB.	2
3	Simulate of simple electric circuit and determine electrical parameters using KCL and KVL using Simulink.	4
4	Simulate of simple electric circuit and determine electrical parameters using Mesh analysis using Simulink.	4
5	Model and simulate an RLC Circuit using Simulink and determine its response to Different Inputs (Step, Pulse, and Sinusoidal).	6
6	Design and Simulate RLC circuit for series and parallel resonance using Simulink.	4
9	Design and analyze BJT amplifier using Simulink.	2
10	Mini Project / Open Simulation	6

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	MATLAB and Simulink for Engineers	Agam Kumar Tyagi	NA	Oxford University Press	2024

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	MATLAB: A Practical Introduction to Programming and Problem Solvin	Stormy Attaway	6th	Elsevier (Academic Press)	2024
2	Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers	Rudra Pratap	NA	Oxford University Press	2024
3	Simulation of Dynamic Systems with MATLAB and Simulink	Harold Klee and Randal Allen	NA	CRC Press	NA

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. No	Type of E-Resource	URL
1	MATLAB & Simulink Training – MathWorks Official	https://matlabacademy.mathworks.com
2	NPTEL	https://archive.nptel.ac.in/courses/103/106/103106118/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the fundamentals of MATLAB programming and utilize built-in functions, arrays, and control statements to solve basic electrical engineering problems.
CO2	Develop MATLAB scripts and functions to analyze electrical circuits and signals using numerical and graphical methods.
CO3	Construct and simulate linear and nonlinear electrical systems using Simulink, including the use of standard block libraries.
CO4	Apply simulation tools to model, analyze, and interpret the behaviour of electrical systems such as RLC circuits, transformers, DC motors, and power converters.
CO5	Demonstrate the ability to create and test time-domain and frequency-domain responses of electrical systems using both MATLAB code and Simulink models.
CO6	Communicate simulation results effectively through plots, reports, and presentations, showing clear understanding of simulation methodology and result interpretation.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	-	3	-	-	-	-	-	-	3	3	-
CO2	3	3	2	1	3	-	-	-	-	-	-	3	3	-
CO3	2	2	2	1	3	-	-	-	-	-	-	3	3	-
CO4	3	2	2	1	3	-	-	-	-	-	-	3	3	-
CO5	2	3	2	1	3	-	-	-	-	-	-	3	2	-
CO6	1	1	1	-	3	-	-	-	-	-	-	2	2	-
AVG	2.33	2.16	1.66	1	3	-	-	-	-	-	-	2.83	2.66	-

Teaching-Learning Process

Pedagogy (General Instructions):

Blended Learning Approach

- Combine theoretical briefing (10–15 minutes per session) with practical simulation tasks.
- Use online video tutorials, MATLAB Onramp, and Simulink Onramp for self-paced learning.

Progressive Learning Structure

- Start with MATLAB basics (data types, plots, functions)
- Gradually progress to Simulink and system-level modeling
- Conclude with mini-projects or open-ended simulation problems

Demonstration-Based Teaching

- Instructor demonstrates core functionalities via live coding and block modeling
- Students replicate models with modifications to enhance understanding

Active Learning Strategies

- Think–Pair–Share: Students troubleshoot each other’s simulation errors
- Debug-the-Code sessions: Students identify and fix bugs in given code/models

- Hands-on practice after each concept (with checklist and guided tasks)

Technology Integration

- Utilize MathWorks resources: MATLAB Live Editor, Simulink Scopes, and Simscape blocks
- Integrate online resources like NPTEL videos and MathWorks documentation in lab sessions

Continuous Assessment and Feedback

- Weekly lab quizzes or coding/simulation challenges
- Oral viva, code walk-throughs, and model explanation
- Formative feedback to help students improve technical reporting and tool proficiency

Collaborative Learning

- Encourage students to work in pairs or small groups
- Share simulation models and discuss different solutions for the same problem

Outcome-Based Learning

- Align each lab activity with defined Course Outcomes (COs)
- Include reflective questions and model evaluation tasks in each session

Completed MATLAB script or Simulink model

Simulation graphs and result screenshots

ELECTRICAL HARDWARE LAB

Course Code	B24EE374	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
2. Provide unhindered access to perform whenever the students wish.
3. Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/device or injuring themselves.

PREREQUISITES

Concept of series, parallel circuits, star& delta connection, earthing, control of lamps

Exp. No	List of Experiments	Hours
1	Verification of KCL and KVL for DC Circuits.	4
2	Measurement of Current, Power and Power Factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp.	2
3	Measurement of Resistance using V-I method.	2
4	Measurement of Resistance and Inductance of a Choke coil using three voltmeter method.	2
5	Relationship between Line and Phase Values of voltage, current in star and delta connection	4
6	Measurement of 3 Phase Power using 2 Wattmeter Method	4
7	SC & OC Test on Simple circuits	4
8	Two-Way and Three-Way Control of Lamp and Formation of Truth Table.	2
9	Measurement of Earth Resistance using fall of potential method.	4
10	Determination of fuse characteristics.	2

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Analyse basic laws and use of these laws to solve electric circuits
CO2	Apply fundamental laws to analyze and verify the behaviour of DC electrical circuits.
CO3	Measure and analyze electrical quantities such as current, voltage, power, power factor, resistance, inductance, and earth resistance using standard methods and instruments.
CO4	Understand and evaluate the performance of three-phase systems

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	1	-	1	-	1	3	-	-
CO2	3	3	-	-	-	-	1	-	1	-	1	3	-	-
CO3	3	3	-	-	-	-	1	-	1	-	1	3	-	-
CO4	3	2	-	-	-	-	1	-	1	-	1	2	-	-
AVG	3	2.75	-	-	-	-	1	-	1	-	1	2.75	-	-

Teaching-Learning Process

Pedagogy (General Instructions): Hands-on, Guided Practice, Active Learning, Real-World Context and Q&A Sessions

ANALOG ELECTRONIC CIRCUITS LAB

Course Code	B24EEL38	Total contact hours / week	02	CIE MARKS	50
Course Category	PCCL	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To design and test half wave and full wave rectifier circuits
2. To design and test different amplifier and oscillator circuits using BJT.
3. To design and test different clipping and clamper circuits
4. To design and test transistor characteristics.
5. To design and test multi stage amplifiers.

PREREQUISITES

Basic Electronics Fundamentals, , Proficiency with Basic Lab Equipment and Cognitive/Analytical Prerequisites

NOTE: Use the Discrete components to test the circuits.

MODULE	TOPICS	Hours
1	Testing of Diode clipping (Single/Double ended) circuits for clipping.	4
2	Testing of Clamping circuits: positive clamping /negative clamping.	2
3	Design and Testing of Full wave - centre tapped transformer type and Bridge type rectifier circuits without Capacitor filter. Determination of ripple factor, regulation and efficiency.	4
4	Design and Testing of Full wave - centre tapped transformer type and Bridge type rectifier circuits with Capacitor filter. Determination of ripple factor, regulation and efficiency.	2
5	Static Transistor characteristics for CE.	2
6	Frequency response of single stage BJT RC coupled amplifier and determination of half power points, bandwidth, input and output impedances.	4
7	Design and testing of BJT - RC phase shift oscillator for given frequency of oscillation.	4
8	Determination of gain, input and output impedance of BJT Darlington emitter follower with and without bootstrapping.	4
9	Testing for the performance of BJT Crystal Oscillator for $f_0 > 100$ KHz	2
10	Design and Simulate Bridge type rectifier circuits with and without Capacitor filter. Determination of ripple factor, regulation and efficiency.	2

PRESCRIBED TEXTBOOKS

Textbook	Book Title	Authors	Edition	Publisher	Year
1	Electronic Devices and Circuit Theory,	Robert L Boylestad Louis Nashelsky	11th	Pearson	2015
2	Electronic Devices and Circuits,	Millman and Halkias	4th	Mc Graw Hill	2015
3	Electronic Devices and Circuits	David A Bell	5th	Oxford University Press	2008

REFERENCE BOOKS

Reference Book	Book Title	Authors	Edition	Publisher	Year
1	Microelectronics Circuits Analysis and Design	Muhammad Rashid	2nd	Cengage Learning	2014
2	A Textbook of Electrical Technology, Electronic Devices and Circuits	B.L. Theraja, A.K. Theraja	NA	S. Chand	Reprint, 2013
3	Electronic Devices and Circuits,	Anil K. Maini, VashaAgarval	1st	Wiley	2009
4	Electronic Devices and Circuits,	S. Salivahanan, Suresh	3rd	Mc Graw Hill	2013
5	Fundamentals of Analog Circuits	Thomas L Floyd	2nd	Pearson	2012

Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Analog circuits are combined together to create sub-systems of complete designs	https://www.ti.com/design-resources/design-tools-simulation/analog-circuits/overview
2	Analog Devices	https://www.analog.com/en/education/education-library/tutorials/analog-electronics.html

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Utilize the characteristics of transistor for different applications
CO2	Design and analyse biasing circuits for transistor.
CO3	Design, analyse and test transistor circuitry as amplifiers and oscillators

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	-	-	2	2	-	2	3	-	1
CO2	3	2	1	-	-	-	-	2	2	-	2	2	-	1
CO3	3	2	1	-	-	-	-	-	2	-	2	2	-	1
AVG	3	2	1	-	-	-	-	2	2	-	2	2.33	-	1

Teaching-Learning Process

Pedagogy (General Instructions): Hands-on, Guided Practice, Active Learning, Real-World Context and Q&A Sessions

NATIONAL SERVICE SCHEME (NSS) – I, II, III & IV

Course Code	B24NSKxxx	Course Category	NCCM	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

COURSE LEARNING OBJECTIVES

National Service Scheme (NSS) will enable the students to:

- 1) Understand the community in general in which they work.
- 2) Identify the needs and problems of the community and involve them in problem –solving.
- 3) Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
- 4) Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
- 5) Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

General Instructions - Pedagogy

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

- 1) In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
- 2) State the need for NSS activities and its present relevance in the society and Provide real-life examples.
- 3) Support and guide the students for self-planned activities.
- 4) You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- 5) Encourage the students for group work to improve their creative and analytical skills.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

Sl. #	CONTENTS
1	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
2	Waste management- Public, Private and Govt organization, 5 R's.
3	Setting of the information imparting club for women leading to contribution in social and economic issues.
4	Water conservation techniques – Role of different stakeholders– Implementation.
5	Preparing an actionable business proposal for enhancing the village income and approach for implementation.
6	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.
7	Developing Sustainable Water management system for rural areas and implementation approaches.
8	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swatch Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.
9	Spreading public awareness under rural outreach programs.(minimum5 programs).
10	Social connect and responsibilities.
11	Plantation and adoption of plants. Know your plants.
12	Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).
13	Govt. school Rejuvenation and helping them to achieve good infrastructure.
NOTE:	
1) Student/s in individual or in a group Should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.	
2) At the end of every semester, activity report should be submitted for evaluation.	

Semester	Sl. #	TOPICS TO BE COVERED
3rd Sem B24NSK391	1	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
	2	Waste management- Public, Private and Govt organization, 5 R's.
	3	Setting of the information imparting club for women leading to contribution in social and economic issues.
4th Sem B24NSK410	4	Water conservation techniques – Role of different stakeholders– Implementation.
	5	Preparing an actionable business proposal for enhancing the village income and approach for implementation.
	6	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.
5th Sem B24NSK591	7	Developing Sustainable Water management system for rural areas and implementation approaches.
	8	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swatch Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	9	Spreading public awareness under rural outreach programs. (minimum 5 programs).
	10	Social connect and responsibilities.
6th Sem B24NSK691	11	Plantation and adoption of plants. Know your plants.
	12	Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).
	13	Govt. school Rejuvenation and helping them to achieve good infrastructure.

Suggested Learning Resources

- 1) NSS Course Manual, Published by NSS Cell, VTU Belagavi.
- 2) Government of Karnataka, NSS cell, activities reports and its manual.
- 3) Government of India, NSS cell, Activities reports and its manual.

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the importance of his / her responsibilities towards society.
CO2	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
CO4	Implement government or self-driven projects effectively in the field.
CO5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO4	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO5	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Plan of Action (Execution of Activities for each semester)

SL. #	Practice Session Description
1	Lecture session by NSS Officer
2	Students Presentation on Topics
3	Presentation - 1 , Selection of topic, PHASE - 1
4	Commencement of activity and its progress - PHASE - 2

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

5	Execution of Activity
6	Execution of Activity
7	Execution of Activity
8	Execution of Activity
9	Execution of Activity
10	Case study based Assessment, Individual performance
11	Sector wise study and its consolidation
12	Video based seminar for 10 minutes by each student At the end of semester with Report.

- In every semester from 3rd semester to 6th semester, each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.

Assessment Details for CIE

Weightage	CIE - 100%	Implementation strategies of the project (NSS work). 1) The last report should be signed by NSS Officer, the HOD and principal. 2) At last report should be evaluated by the NSS officer of the institute. 3) Finally the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.
Presentation - 1 Selection of topic, PHASE - 1	10 Marks	
Commencement of activity and its progress - PHASE - 2	10 Marks	
Case study based Assessment Individual performance	10 Marks	
Sector wise study and its consolidation	10 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report.	10 Marks	
Total marks for the course in each semester	50 Marks	

Marks scored for 50 by the students should be Scale down to 25 marks In each semester for CIE entry in the portal.

25 marks CIE entry will be entered in IA marks portal at the end of each semester 3rd to 6th sem, Report and assessment copy should be made available in the department semester wise.

Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

Pedagogy – Guidelines: It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl. #	Topic	Group Size	Location	Activity Execution	Reporting	Evaluation of the topic
1	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmers land / Villages / roadside / community area/ College campus etc...	Site selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
2	Waste management- Public, Private and Govt organization, 5 R's.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Site selection / proper consultation / Continuous monitoring / Information board		
3	Setting of the information imparting club for women leading to contribution in social and economic issues.	May be individual or team	Women empowerment groups / Consulting NGOs & Govt Teams / College campus etc...	Group selection / proper consultation / Continuous monitoring / Information board		
4	Water conservation techniques – Role of different stakeholders– Implementation.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc...	Site selection / proper consultation / Continuous monitoring / Information board		
5	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc...	Group selection / proper consultation / Continuous monitoring / Information board		
6	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	May be individual or team	Local government / private / aided schools / Government Schemes officers / etc.....	School selection / proper consultation / Continuous monitoring / Information board		
7	Developing Sustainable Water management system for rural areas and	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers /	Site selection / proper consultation / Continuous monitoring / Information board		

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	implementation approaches.		campus etc.....			
8	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Group selection / proper consultation / Continuous monitoring / Information board		
9	Spreading public awareness under rural outreach programs. (minimum 5 programs). /// Social connect and responsibilities.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Group selection / proper consultation / Continuous monitoring / Information board		
10	Plantation and adoption of plants. Know your plants.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Place selection / proper consultation / Continuous monitoring / Information board		
11	Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Place selection / proper consultation / Continuous monitoring / Information board		
12	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Place selection / proper consultation / Continuous monitoring / Information board		

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – I

Course Code	B24PEK391	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Orientation A) Lifestyle B) Health & Wellness C) Pre-Fitness test.	4 Hours
2	General Fitness & Components of Fitness A) Warming up (Free Hand exercises) B) Strength – Push-up / Pull-ups C) Speed – 30 Mtr Dash	4 Hours
3	Specific games (Any one to be selected by the student) 1) Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. 2) Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.	16 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
CO2	Familiarization of health-related Exercises, Sports for overall growth and development
CO3	Create a foundation for the professionals in Physical Education and Sports
CO4	Participate in the competition at regional /state / national / international levels.
CO5	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.
CO6	Understand and practice of Traditional Games

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
C01	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C02	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C03	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C04	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C05	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – II

Course Code	B24PEK410	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Ethics and Moral Values A) Ethics in Sports B) Moral Values in Sports and Games	4 Hours
2	Specific Games (Any one to be selected by the student) A) Volleyball – Attack, Block, Service, Upper Hand Pass and Lower hand Pass. B) Athletics (Track Events) – Any event as per availability of Ground.	16 Hours
3	Role of Organisation and administration	4 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the ethics and moral values in sports and athletics
CO2	Perform in the selected sports or athletics of student's choice.
CO3	Understand the roles and responsibilities of organisation and administration of sports and games.

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – III

Course Code	B24PEK591	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Orientation A) Fitness B) Food & Nutrition	4 Hours
2	General Fitness & Components of Fitness A) Agility – Shuttle Run B) Flexibility – Sit and Reach C) Cardiovascular Endurance – Harvard step Test	4 Hours
3	Specific games (Any one to be selected by the student) 1) Badminton (Fore hand low/high service, back hand service, smash, drop) 2) Basketball (Dribbling, passing, shooting etc.) 3. Athletics (Field events – Throws)	16 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the fundamental concepts and skills of Physical Education, Health, Food, Nutrition and general fitness
CO2	Familiarization of health-related Exercises, Sports for overall growth and development
CO3	Create a foundation for the professionals in Physical Education and Sports
CO4	Participate in the competition at regional/state / national / international levels.
CO5	Understand and practice of specific games and athletic throwing events.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C02	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C03	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C04	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C05	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – IV

Course Code	B24PEK691	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Orientation 1) Postural deformities. 2) Stress management	4 Hours
2	Specific Games (Any one to be selected by the student) 1) Throw ball 2) Table Tennis 3) Athletics (Field Events- Jumps) – Any event as per availability of Ground.	16 Hours
3	Aerobics	4 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the Postural deformities and Stress management in sports and athletics
CO2	Participate in the competition at regional/state / national / international levels.
CO3	Understand and practice of specific games and athletic Jumping events.
CO4	Understand and practice of Aerobics.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO4	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

YOGA - I

Course Code	B24YOK391	Course Category	NCCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Introduction of Yoga, Aim and Objectives of yoga, Prayer Brief introduction of yogic practices for common man Rules and regulations Misconceptions of yoga	Yoga, its meaning, definitions. Different schools of yoga, importance of prayer Yogic practices for common man to promote positive health Rules to be followed during yogic practices by practitioner Yoga its misconception	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar prayer and its meaning, Need, importance and benefits of Suryanamaskar 12 count, 2 rounds	
Different types of Asanas a) Sitting 1. Padmasana 2. Vajrasana b) Standing 1. Vrikshana 2. Trikonasana c) Prone line 1. Bhujangasana 2. Shalabhasana d) Supine line 1. utthitadvipadasana 2. Ardhalasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana	

YOGA – II

Course Code	B24YOK410	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Patanjali's Ashtanga Yoga 1. Yama 2. Niyama	Patanjali's Ashtanga Yoga. Yama: Ahimsa, satya, asteya, brahm acarya, aparigraha Niyama: shoucha, santosh, tapa svaadhyaya, Eshvarapranidhan	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar 12 count 4 rounds	
Different types of Asanas a) Sitting 1. Sukhasana 2. Paschimottanasana b) Standing 1. Ardhakati Chakrasana 2. Parshva Chakrasana c) Prone line 1. Dhanurasana d) Supine line 1. Halasana 2. Karna Peedasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits each asana	
Kapalabhati	Meaning, importance and benefits of Kapalabhati. 40 strokes/min 3 rounds	
Pranayama – 1. Suryanuloma -Viloma 2. Chandranuloma-Viloma 3. Suryabhedana 4. Chandra Bhedana 5. Nadishodhana	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

YOGA – III

Course Code	B24YOK591	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Patanjali's Ashtanga Yoga 3. Asana 4. Pranayama 5. Pratyahara	Patanjali's Ashtanga Yoga – its need and importance	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar 12 count 6 rounds	
Different types of Asanas a) Sitting 1. Ardha Ushtrasana 2. Vakrasana 3. Yogamudra in Padmasana b) Standing 1. UrdhvaHastothanasana 2. Hastapadasana 3. ParivrittaTrikonasana 4. Utkatasana c) Supine line 1. Sarvangasana 2. Chakraasana 3. Pavanamuktasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits each asana	
Kapalabhati	Revision of practice. 60 strokes/min 3 rounds	
Pranayama – 1. Ujjayi 2. Sheetali 3. Shektari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

YOGA – IV

Course Code	B24YOK691	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Patanjali's Ashtanga Yoga 1. Dharana 2. Dhyana (Meditation) 3. Samadhi	Patanjali's Ashtanga Yoga – its need and importance	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar 12 count 8 rounds	
Different types of Asanas a) Sitting 1. Bakasana 2. Hanumanasana 3. Ekapada Rajakapotasana 4. Yogamudra in Vajrasana b) Standing 1. Vatayanasana 2. Garudasana c) Balancing 1. Veerabhadrasana 2. Sheershasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits each asana	
Kapalabhati	Revision of Kapalabhati practice. 80 strokes/min 3 rounds	
Pranayama – 1. Bhastrika 2. Bhramari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

STATISTICS, PROBABILITY AND COMPLEX VARIABLES

Course Code	B24MAT41E	Total contact hours / week	03	CIE MARKS	50
Course Category	BSC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Use of statistical methods in curve fitting applications.
2. Introduce the concept of random variables, probability distributions, specific discrete and continuous distributions with practical application in Electrical and Electronics Engineering and social life situations.
3. Provide the principles of statistical inferences and the basics of hypothesis testing with emphasis on some commonly encountered hypotheses.
4. Provide an insight into applications of complex variables.

PREREQUISITES

Fundamentals of Statistics and probability theory, Complex numbers

MODULE	TOPICS	Hours
1	Statistics	
	Principles of least squares, Curve fitting by the method of least squares in the form $y = a + bx$, $y = a + bx + cx^2$, and $y = ax^b$. Correlation, Co-efficient of correlation, lines of regression, angle between regression lines, rank correlation.	8
2	Probability Distributions	
	Review of basic probability theory, Random variables-discrete and continuous Probability distribution function, cumulative distribution function, Mathematical Expectation, mean and variance, Binomial, Poisson, Exponential and Normal distribution (without proofs for mean and SD) – Problems.	9
3	Joint probability distribution and Stochastic Process	
	Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance and correlation. Stochastic Process: Introduction to Markov chain, Probability Vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Higher transition probabilities, Stationary distribution of Regular Markov chains and absorbing states.	9
4	Statistical Inference	
	Introduction, sampling distribution, standard error, testing of hypothesis, levels of significance, test of significances, confidence limits, simple sampling of attributes, test of significance for large samples, comparison of large samples. Sampling variables, central limit theorem and confidences limit for unknown	8

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	mean. Test of Significance for means of two small samples, students 't' distribution.	
5	Complex Variables and Complex Functions	
	Complex variables, functions of complex variables, limits, continuity and differentiability. Analytic functions. Cauchy-Riemann Equations in Cartesian and polar forms. Problems. Construction of analytic functions-Milne Thompson Method.	8

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	B.S.Grewal	44 th	Khanna Publishers	2021
2	Advanced Engineering Mathematics	E.Kreyszig	10 th	John Wiley & Sons	2016

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	V. Ramana	11 th	McGraw-Hill Education	2017
2	Engineering Mathematics	Srimanta Pal & Subodh C. Bhunia	3 rd	Oxford University Press	2016
3	A Text book of Engineering Mathematics	N.P Bali and Manish Goyal	10 th	Laxmi Publications	2022
4	Advanced Engineering Mathematics	C.Ray Wylie , Louis C. Barret	6 th	McGraw-Hill Book Co., New York	2017
5	Engineering Mathematic for Semester I and II	Gupta C.B, Sing S.Rand Mukesh Kumar	NA	Mc-GrawHill Education(India) Pvt. Ltd	2015
6	Fundamentals of Mathematical Statistics	S C Gupta and V K Kapoor	NA	S Chand and Company	NA
7	Mathematical Statistics with Applications	Irwin Miller & Marylees Miller	8 th	Pearson. Dorling Kindersley Pvt. Ltd.	2014

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	NPTEL	http://nptel.ac.in/courses.php?disciplineID=111
2	MOOCs	http://www.class-central.com/subject/math
3	MOOCs	http://academicearth.org/mathematics
4	VTU e-Shikshana Program	
5	VTU EDUSAT Program	

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data
CO2	Apply suitable probability distribution models for the given scenario.
CO3	Explain the concept of Joint Probability Distribution and apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
CO4	Able to apply the various measures and Sampling Techniques to analyze huge volume of data.
CO5	Use the concept of analytic function and complex potentials to solve the problems arising in electromagnetic field theory

CO-PO-PSO Mapping

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

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
 - As an introduction to new topics (pre-lecture activity).
 - As a revision of topics (post-lecture activity).
 - As additional examples (post-lecture activity).
 - As an additional material of challenging topics (pre-and post-lecture activity).
 - As a model solution of some exercises (post-lecture activity).

POWER ELECTRONICS

Course Code	B24EE42	Total contact hours / week	05	CIE MARKS	50
Course Category	IPCC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:2:0	Total Notional Learning Hours	120	TOTAL MARKS	100
Total credits	04			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To give an overview of applications power electronics, different types of power semiconductor devices, their switching characteristics.
2. To explain power diode characteristics, types, their operation and the effects of power diodes on RL circuits.
3. To explain the techniques for design and analysis of single phase diode rectifier circuits.
4. To explain different power transistors, their steady state and switching characteristics and imitations.
5. To explain different types of Thyristors, their gate characteristics and gate control requirements.
6. To explain the design, analysis techniques, performance parameters and characteristics of controlled rectifiers, DC- DC, DC -AC converters and Voltage controllers.

PREREQUISITES

1. Basic Electrical Engineering

- Understanding of electrical circuits, Ohm's law, Kirchhoff's laws.
- Knowledge of AC and DC circuits, power, energy, and basics of electrical machines.

2. Electronic Devices and Circuits

- Familiarity with semiconductor devices: diodes, BJTs, MOSFETs, IGBTs.
- Circuit analysis using transistors and operational amplifiers.

3. Network Theory / Circuit Theory

- Techniques such as Thevenin's and Norton's theorems, mesh and nodal analysis.
- Transient and steady-state analysis of RLC circuits.

4. Signals and Systems (Basic Level)

- Understanding how systems respond to input signals.
- Basics of Fourier series and Laplace transforms (helpful for filter and converter analysis).

5. Mathematics

- Differential equations and linear algebra for analyzing dynamic systems.
- Complex numbers and phasor analysis for AC circuits.

6. Control Systems (Helpful but not always mandatory)

- Basics of feedback, stability, and system response are useful in advanced topics like converter control.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

MODULE #	TOPICS	Hours
1	<p>Introduction: Applications of Power Electronics, Types of Power Electronic Circuits, Peripheral Effects, Characteristics and Specifications of Switches.</p> <p>Power Diodes: Introduction, Diode Characteristics, Reverse Recovery Characteristics, Power Diode Types, Silicon Carbide Diodes, Silicon Carbide Schottky Diodes Freewheeling diode.</p> <p>Diode Rectifiers: Introduction, Single-Phase Full Wave Rectifiers with R load, Single-Phase Full-Wave Rectifier with RL Load.</p>	9
2	<p>Power Transistors: Introduction, Power MOSFETs – Steady State Characteristics, Switching Characteristics Bipolar Junction Transistors – Steady State Characteristics, Switching Characteristics, Switching Limits, IGBTs, MOSFET Gate Drive, BJT Base Drive, Isolation of Gate and Base Drives, Pulse transformers and Opto-couplers.</p>	8
3	<p>Thyristors: Introduction, Thyristor Characteristics, Two-Transistor Model of Thyristor, Thyristor Turn-On, Thyristor Turn-Off, A brief study on Thyristor Types, Series Operation of Thyristors, Parallel Operation of Thyristors, di/dt Protection, dv/dt Protection, DIACs, Thyristor Firing Circuits, Unijunction Transistor.</p>	9
4	<p>Controlled Rectifiers: Introduction, Single-Phase Full Converters with RLE Load, Single-Phase Dual Converters, Principle of operation of Three-Phase Dual Converters.</p> <p>AC Voltage Controllers: Introduction, Principle of phase control & Integral cycle control, Single-Phase Full Wave Controllers with Resistive Loads, Single-Phase Full-Wave Controllers with Inductive Loads, Three Phase Full-Wave Controllers.</p>	8
5	<p>DC-DC Converters: Introduction, principle of step down and step up chopper with RL load, performance parameters, DC-DC converter classification. DC-AC Converters: Introduction, principle of operation single phase bridge inverters, three phase bridge inverters, voltage control of single phase inverters, Harmonic reductions, Current source inverters.</p>	8

Exp. No	Practice(Laboratory)Part
	Experiments
1	Static Characteristics of SCR.
2	Static Characteristics of MOSFET and IGBT.
3	SCR turn on circuit using synchronized UJT relaxation oscillator.
4	SCR digital triggering circuit for a single phase controlled rectifier and ac voltage regulator.
5	Single phase controlled full wave rectifier with R load, R -L load, R-L-E load with and without freewheeling diode.
6	AC voltage controller using TRIAC and DIAC combination connected to R and RL loads.
7	Speed control of a separately excited D.C. Motor using an IGBT or MOSFET chopper.
8	Speed control of universal motor using ac voltage regulator.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Power Electronics: Circuits Devices and Applications	Mohammad H Rashid	4th	Pearson	2014

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Power Electronics	P.S. Bimbhra	5 th	Khanna Publishers	2012
2	Power Electronics: Converters, Applications and Design	Ned Mohan et al	3rd	Wiley	2014
3	Power Electronics	Daniel W Har	1 st	McGraw Hill	2011
4	Elements of Power Electronics	Philip T Krein	Indian Edition	Oxford	2008

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl #	Type of E-Resource	URL
1	NPTEL	https://onlinecourses.nptel.ac.in/noc25_ee100/preview
2	Youtube	https://www.youtube.com/watch?v=PkHSD5nuAwQ&list=PL_mruqjnuVd9_mwhgK3nAy-cHyslXCnRk

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
C01	To give an overview of applications power electronics, different types of power semiconductor devices, their switching characteristics, power diode characteristics, types, their operation and the effects of power diodes on RL circuits.
C02	To explain the techniques for design and analysis of single phase diode rectifier circuits.
C03	To explain different power transistors, their steady state and switching characteristics and limitations.
C04	To explain different types of Thyristors, their gate characteristics and gate control requirements.
C05	To explain the design, analysis techniques, performance parameters and characteristics of controlled rectifiers, DC- DC, DC -AC converters and Voltage controllers.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	2	1	-	-	-	-	-	-	-	-	1	1	-	-
C02	2	2	-	-	-	-	-	-	1	-	1	3	-	-
C03	3	1	-	-	-	-	-	-	1	-	1	1	-	-
C04	3	2	-	-	-	-	-	-	1	-	1	3	-	-
C05	3	2	-	-	-	-	-	-	1	-	1	3	-	-
AVG	2.6	1.6	-	-	-	-	-	-	1	-	1	2.2	-	-

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
 7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
 8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

ELECTRIC MOTORS

Course Code	B24EE43	Total contact hours / week	05	CIE MARKS	50
Course Category	IPCC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:2:0	Total Notional Learning Hours	120	TOTAL MARKS	100
Total credits	04			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To study the constructional features of motors and select suitable drive for specific application.
2. To study the constructional features of three-phase and single-phase induction motors.
3. To study different tests to be conducted for the assessment of performance characteristics of motors.
4. To study the speed control of motors by different methods.
5. Explain the construction and operation of synchronous motors and special motors.

PREREQUISITES

Basic Electrical Engineering

MODULE #	TOPICS	Hours
1	<p>DC Motors: Construction and working principle. Back E.M.F and its significance, Torque equation, Classification, Characteristics of shunt, series & compound motors, Speed control of shunt motor, Application of motors. Three-point starter of DC motor.</p> <p>Losses and Efficiency-Losses in DC motors, power flow diagram, efficiency, condition for maximum efficiency.</p> <p>Testing of DC Motors: Direct & indirect methods of testing of DC motors - Swinburne's test, Field's test, merits and demerits of tests (numerical as applicable).</p>	9
2	<p>Three-Phase Induction Motors: Concept and generation of rotating magnetic field, Principle of operation, construction, classification and types; squirrel-cage, slip-ring. Slip and its significance, Torque equation, torque-slip characteristic covering motoring, generating and braking regions of operation, Maximum torque, (numerical as applicable).</p>	8
3	<p>Performance of Three-Phase Induction Motor: Phasor diagram of induction motor on no-load and on load, equivalent circuit, losses, efficiency, No-load and blocked rotor tests. Performance of the motor from the equivalent circuit. Cogging and crawling. High torque rotors-double cage and deep rotor bars. Induction motor working as induction generator, construction and working of doubly fed induction generator. (numerical as applicable)</p>	9
4	<p>Starting and Speed Control of Three-Phase Induction Motors: Necessity of starter. Direct online, Star-Delta, and autotransformer</p>	8

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	starting. Rotor resistance starting. Speed control by frequency. Single- Phase Induction Motor: Double revolving field theory and principle of operation. Construction and operation of split-phase, capacitor start and capacitor run and shaded pole motors. Comparison of single phase motors and applications. (numerical as applicable)	
5	Synchronous Motor: Principle of operation, phasor diagrams, torque and torque angle, effect of change in load, effect of change in excitation. V and inverted V curves. Synchronous condenser, Special Motors: Construction, operation and applications of Universal motor, Linear induction motor, SRM and BLDC.	8

Exp. No	Practice(Laboratory)Part
	Experiments
1	Load test on DC shunt motor to draw speed-torque and horse power-efficiency characteristics.
2	Speed control of DC shunt motor by armature and field control.
3	Swinburne's Test on DC motor.
4	Performance analysis of three phase induction motor.
5	Load test on single phase induction motor to draw output versus torque, current, power and efficiency characteristics.
6	Conduct an experiment to draw V and Inverted V curves of synchronous motor at no load and load conditions.
7	Analyze current and load torque of DC Shunt Motor using Simscape tool.matlab
8	Performance analysis of three-phase induction motor using MATLAB and Simulink.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Electric Machines	D.P. Kothari, I.J.Nagrath	4 th	McGraw Hill	2011
2	Theory of Alternating Current Machines	Alexander Langsdorf	2 nd	McGraw Hill	2001
3	Electric Machines	Ashfaq Hussain	2 nd	Dhanpat Rai & Co	2013

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Electrical Machines, Drives and Power Systems	Theodore Wildi	6 th	Pearson	2014
2	Electrical Machines	M V Deshpande	3 rd	PHI Learning	2013
3	Electric Machinery and Transformers	Bhag S Gurustal	3 rd	Oxford University Press	2012
4	Principles of Electric Machines and Power Electronics	P C Sen	2 nd	Wiley	2013
5	Electric Machinery and Transformers	Irving Kosow	2 nd	Pearson	2012
6	Electrical Machines	R K Srivatsa	2 nd	Ceneage Learning	2013

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Video lectures	https://archive.nptel.ac.in/courses/108/105/108105155/
2	Video lectures	https://nptel.ac.in/courses/108102146

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the construction and operation, characteristics, Testing of DC Motors and determine efficiency, and simulate the performance of DC motor using MATLAB / Simulink.
CO2	Understand the construction and operation, classification and types of Three phase Induction motors.
CO3	Describe the performance characteristics and applications of three phase Induction motors, and simulate the performance of three-phase induction motor using MATLAB / Simulink.
CO4	Demonstrate and explain Speed Control methods of three phase induction motor and types of single phase induction motors.
CO5	Understand the construction and operation, V and inverted V curves of synchronous motors
CO6	Construction and operation of Universal motor, servomotor, Linear induction motor, PMSM, stepper motor, SRM and BLDC motors.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	3	3	-	1	3	-	-	-	-	-	-	3	2	-
C02	3	2	-	1	-	1	-	-	-	-	-	3	-	-
C03	3	3	-	1	3	-	-	-	-	-	-	3	2	-
C04	3	2	-	1	-	-	-	-	-	-	-	3	-	-
C05	3	2	-	1	-	-	-	-	-	-	-	3	-	-
C06	3	-	-	-	-	1	-	-	-	-	1	3	-	-
AVG	3	2.4	-	1	3	1	-	-	-	-	1	3	2	-

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) need not be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video /Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students 'Analytical skills develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits / logic and encourage the students to come up with their own creative ways to solve them.

Discuss how every concept can be applied to the real world and when that's possible, it helps improve the students' understanding

TRANSMISSION AND DISTRIBUTION

Course Code	B24EE44	Total contact hours / week	03	CIE MARKS	50
Course Category	PCC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To understand the structure of electrical power system, its components, advantages of high voltage AC and DC transmission, various conductors used for transmission, sag and its calculation.
2. To understand various types of insulators, methods to improve string efficiency.
3. To understand the various transmission line parameters, their effects on transmission of electricity.
4. To understand the various parameters that influences the performance of transmission line and to calculate performance parameters of various transmission lines.
5. To understand corona and its effects, underground cables, its construction, classification, limitations and specifications.
6. To understand and evaluate different types of distribution systems.

PREREQUISITES

- **Basic Electrical Engineering**
 - Understanding of Ohm's law, Kirchhoff's laws
 - DC and AC circuit analysis
 - Single-phase and three-phase systems
- **Network Analysis**
 - Mesh and nodal analysis
 - Thevenin's and Norton's theorems
 - Transient and steady-state analysis
 - Resonance in RLC circuits
- **Electrical Machines**
 - Working of transformers (especially 3-phase transformers)
 - Basics of synchronous and asynchronous machines
 - Generation of electrical power
- **Electromagnetic Field Theory (EMFT)**
 - Basics of electric and magnetic fields
 - Maxwell's equations
 - Transmission line parameters (inductance and capacitance calculations)
- **Mathematics**
 - Differential equations and basic calculus
 - Phasor analysis for sinusoidal systems, Complex numbers and vector algebra

MODULE #	TOPICS	Hours
1	<p>Introduction to Power System: Structure of electric power system: generation, transmission and distribution. Advantages of higher voltage transmission: HVAC, EHVAC, UHVAC and HVDC. Interconnection. Feeders, distributors and service mains.</p> <p>Overhead Transmission Lines: A brief introduction to types of supporting structures and line conductors- Conventional conductors and High temperature conductors. Bundle conductor and its advantages. Importance of sag, Sag calculation – supports at same and different levels, effect of wind and ice. Line vibration and vibration dampers. Overhead line protection against lightening; ground wires.</p> <p>Overhead Line Insulators: A brief introduction to types of insulators, material used- porcelain, toughened glass and polymer (composite). Potential distribution over a string of suspension insulators. String efficiency, Methods of increasing string efficiency. Arcing horns.</p>	9
2	<p>Line Parameters: Introduction to line parameters- resistance, inductance and capacitance. Calculation of inductance of single phase and three phase lines with equilateral spacing, unsymmetrical spacing. Inductance of composite – conductors, geometric mean radius (GMR) and geometric mean distance (GMD). Calculation of capacitance of single phase and three phase lines with equilateral spacing, unsymmetrical spacing. Capacitance of composite – conductor, geometric mean radius (GMR) and geometric mean distance (GMD). Advantages of single circuit and double circuit lines.</p>	9
3	<p>Performance of Transmission Lines: Classification of lines – short, medium and long. Current and voltage relations, line regulation and Ferranti effect in short length lines, medium length lines considering Nominal T and nominal circuits, and long lines considering hyperbolic form equations. Equivalent circuit of a long line. ABCD constants in all cases.</p>	8
4	<p>Corona: Phenomena, disruptive and visual critical voltages, corona loss. Advantages and disadvantages of corona. Methods of reducing corona.</p> <p>Underground Cable: Types of cables, constructional features, insulation resistance, thermal rating, charging current, grading of cables – capacitance and inter-sheath. Dielectric loss. Comparison between ac and DC cables. Limitations of cables. Specification of power cables.</p>	8
5	<p>Distribution: Primary AC distribution systems – Radial feeders, parallel feeders, loop feeders and interconnected network system. Secondary AC distribution systems – Three phase 4 wire system and single phase 2 wire distribution, AC distributors with concentrated loads. Effect of disconnection of neutral in a 3 phase four wire system, types of substation (single line diagram), Voltage Control and Power Factor Improvement Techniques.</p> <p>Reliability and Quality of Distribution System: Introduction, definition of reliability, failure, probability concepts, limitation of</p>	8

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	distribution systems, power quality, Reliability aids, protective devices, Trends in Transmission and Distribution.	
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PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	A Course in Electrical Power	Sony Gupta and Bhatnagar, Dhanpat Rai	1 st	Dhanpat Rai Publications	2009
2	Principles of Power System	V.K. Mehta, Rohit Mehta, S. Chand	1 st	S. Chand & Company Ltd.	2013

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Power System Analysis and Design	J. Duncan Gloveratel, Cengage Learning	4 th	Cengage Learning (listed as CL Engineering)	2008
2	Electrical power Generation, Transmission and Distribution	S.N. Singh	2 nd	PHI	2009
3	Electrical Power	S.L.Uppal	1 st	Khanna Publication	2011
4	Electrical Power Systems	C. L. Wadhwa	5 th	New Age	2009
5	Electrical Power Systems	Ashfaq Hussain	NA	CBS Publishers & Distributors Pvt Ltd	2014
6	Electric Power Distribution	A.S. Pabla	6 th	McGraw-Hill	2012

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	NPTEL	https://onlinecourses.nptel.ac.in/noc25_ee141/preview
2	Youtube	https://www.youtube.com/watch?v=A9sRsIghUxY&list=PLjUJmyxBMDHXnRjf9qLmtStrMmIpL4SJS

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain the structure of electrical power system, its components, advantages of high voltage AC and DC transmission, various conductors used for transmission, sag and its calculation.
CO2	Explain various types of insulators and methods to improve string efficiency.
CO3	Explain the various transmission line parameters, their effects on transmission of electricity.
CO4	Evaluate the parameters that influence the performance of transmission line and to calculate performance parameters of various transmission lines.
CO5	Explain corona and its effects, underground cable and its construction, classification, limitations and specifications, evaluate different types of distribution systems.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	1	3	-	-
CO2	3	2	-	-	-	-	-	-	-	-	1	2	-	-
CO3	3	2	-	-	-	-	-	-	-	-	1	3	-	-
CO4	3	3	-	-	-	-	-	-	-	-	1	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	1	2	-	-
AVG	3	2.2	-	-	-	-	-	-	-	-	1	2.6	-	-

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.

ELECTRICAL POWER GENERATION AND ECONOMICS

Course Code	B24EE451	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To understand the basics of hydroelectric power plant, merits and demerits of hydroelectric power plants, site selection, arrangement and elements of hydroelectric plant
2. To understand the working, site selection and arrangement of Steam, Diesel and Gas Power Plants.
3. To understand the working, site selection and arrangement of Nuclear Power Plants.
4. To understand importance of different equipment's in substation, Interconnection of power stations and different types of grounding.
5. To understand the economics of power generation.

PREREQUISITES

Basic Electrical Engineering.

MODULE #	TOPICS	Hours
1	Hydroelectric Power Plants: Hydrology, run off and stream flow, hydrograph, flow duration curve, Mass curve, reservoir capacity, dam storage. Hydrological cycle, merits and demerits of hydroelectric power plants, Selection of site. General arrangement of hydel plant, elements of the plant, Classification of the plants based on water flow regulation, water head and type of load the plant has to supply. Water turbines – Pelton wheel, Francis, Kaplan and propeller turbines. Characteristic of water turbines Governing of turbines, selection of water turbines. Underground, small hydro and pumped storage plants. Choice of size and number of units, plant layout and auxiliaries.	9
2	Steam Power Plants: Introduction, Efficiency of steam plants, Merits and demerits of plants, selection of site. Working of steam plant, Power plant equipment and layout, Steam turbines, Fuels and fuel handling, Fuel combustion and combustion equipment, Coal burners, Fluidized bed combustion, Combustion control, Ash handling, Dust collection, Draught systems, Feed water, Steam power plant controls, plant auxiliaries. Diesel Power Plant: Introduction, Merits and demerits, selection of site, elements of diesel power plant, applications. Gas Turbine Power Plant: Introduction Merits and demerits, selection of site, Fuels for gas turbines, Elements of simple gas turbine power plant, Methods of improving thermal efficiency of a simple gas power plant, Closed cycle gas turbine power plants. Comparison of gas power plant with steam and diesel power plants.	9

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

3	<p>Nuclear Power Plants: Introduction, Economics of nuclear plants, Merits and demerits, selection of site, Nuclear reaction, Nuclear fission process, Nuclear chain reaction, Nuclear energy, Nuclear fuels, Nuclear plant and layout, Nuclear reactor and its control, Classification of reactors, power reactors in use, Effects of nuclear plants, Disposal of nuclear waste and effluent, shielding.</p>	8
4	<p>Substations: Introduction to Substation equipment; Transformers, High Voltage Fuses, High Voltage Circuit Breakers and Protective Relaying, High Voltage Disconnect Switches, Lightning Arresters, High Voltage Insulators and Conductors, Voltage Regulators, Storage Batteries, Reactors, Capacitors, Measuring Instruments, and power line carrier communication equipment. Classification of substations – indoor and outdoor, Selection of site for substation, Bus-bar arrangement schemes and single line diagrams of substations. Interconnection of power stations. Introduction to gas insulated substation, Advantages and economics of Gas insulated substation.</p> <p>Grounding: Introduction, Difference between grounded and ungrounded system. System grounding – ungrounded, solid grounding, resistance grounding, reactance grounding, resonant grounding. Earthing transformer. Neutral grounding and neutral grounding transformer.</p>	8
5	<p>Economics: Introduction, Effect of variable load on power system, classification of costs, Cost analysis. Interest and Depreciation, Methods of determination of depreciation, Economics of Power generation, different terms considered for power plants and their significance, load sharing. Choice of size and number of generating plants. Tariffs, objective, factors affecting the tariff, types. Types of consumers and their tariff. Power factor, disadvantages, causes, methods of improving power factor, Advantages of improved power factor, economics of power factor improvement and comparison of methods of improving the power factor. Choice of equipment.</p>	8

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Power Plant Engineering	P.K. Nag	4 th	Mc Graw Hill	2014
2	Electrical power Generation, Transmission and Distribution	S.N. Singh	2 nd	PHI	2009
3	Generation of Electrical Energy	B.R. Gupta	NA	S. Chand	2015

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	A Course in Power Systems	J.B. Gupta	NA	Katson	2013
2	A Text Book on Power System Engineering	A. Chakrabarti, et al	2 nd	Dhanpath Rai	2010
3	Electrical Power Distribution Systems	V. Kamaraju	1st	McGrawHill	2009

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	YouTube videos	https://www.youtube.com/watch?v=j_JL-Z_h6Q
2	www.nptel.ac.in	https://onlinecourses.nptel.ac.in/noc22_me73/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain the basics of hydroelectric power plant, merits and demerits of hydroelectric power plants, site selection, arrangement and elements of hydroelectric plant.
CO2	Explain the working, site selection and arrangement of Steam, Diesel and Gas Power Plants.
CO3	Explain the working, site selection and arrangement of Nuclear Power Plants.
CO4	Explain the importance of different equipment in substation, Interconnection of power stations and different types of grounding.
CO5	Explain the economics of power generation.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	2	-	-	-	-	-	3	-	-
CO2	3	1	-	-	-	2	-	-	-	-	-	3	-	-
CO3	3	1	-	-	-	2	-	-	-	-	-	3	-	-
CO4	3	1	-	-	-	2	-	-	-	-	-	3	-	-
CO5	3	2	-	-	-	2	-	-	-	-	2	3	-	-
AVG	3	1.2	-	-	-	2	-	-	-	-	2	3	-	-

Teaching-Learning Process

Pedagogy (General Instructions):

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6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.

OP-AMP AND LIC

Course Code	B24EE452	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To understand the basics of Linear ICs such as Op-amp, Regulator, Timer & PLL.
2. To learn the designing of various circuits using linear ICs.
3. To use these linear ICs for specific applications.
4. To understand the concept and various types of converters.
5. To use these ICs, in Hardware projects

PREREQUISITES

Basic Electronics Fundamentals, Basic Electrical Electronics.

MODULE #	TOPICS	Hours
1	<p>Operational amplifiers: Introduction, Block diagram representation of a typical Op-amp, schematic symbol, characteristics of an Op-amp, ideal op-amp, equivalent circuit, ideal voltage transfer curve, open loop configuration, differential amplifier, inverting & non-inverting amplifier, Op-amp with negative feedback; voltage series feedback amplifier-gain, input resistance, output resistance, voltage shunt feedback amplifier-gain, input resistance, output resistance.</p> <p>General Linear Applications: D.C. & A.C amplifiers, peaking amplifier, summing, scaling & averaging amplifier, inverting and non-inverting configuration, differential configuration, instrumentation amplifier</p>	9
2	<p>Active Filters: First & Second order high pass & low pass Butterworth filters, higher order filters, Band pass filters, Band reject filters & all pass filters.</p> <p>DC Voltage Regulators: voltage regulator basics, voltage follower regulator, adjustable output regulator, LM317 & LM337 Integrated circuits regulators</p>	8
3	<p>Signal generators: Working and derivation of frequency of oscillation for Phase shift oscillator, Wien bridge oscillator, square wave generator, sawtooth wave generator, triangular wave generator, rectangular wave generator.</p> <p>Comparators & Converters: Basic comparator, zero crossing detector, inverting & noninverting Schmitt trigger circuit, voltage to current converter with grounded load, current to voltage converter and basics of voltage to frequency and frequency to voltage converters.</p>	9

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

4	<p>Signal processing circuits: Precision half wave & full wave rectifiers limiting circuits, clamping circuits, peak detectors, sample & hold circuits.</p> <p>A/D & D/A Converters: Basics, R-2R D/A Converter, Integrated circuit 8-bit D/A, successive approximation ADC, linear ramp ADC, dual slope ADC, digital ramp ADC</p>	8
5	<p>Phase Locked Loop (PLL): Basic PLL, components, performance factors, applications of PLL IC</p> <p>555 Timer: Internal architecture of 555 timer, Mono stable, Astable-multi-vibrators and applications</p>	8

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Op-Amps and Linear Integrated Circuits	Ramakant A Gayakwad	4th	Pearson	2015
2	Operational Amplifiers and Linear ICs	David A. Bell	3rd	Oxford	2011

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Linear Integrated Circuits	S. Salivahanan	4 th	Wiley India	2013
2	Op-Amps and Linear Integrated Circuits, Concept and Application	James M Fiore	3 rd	Cengage	2009

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	NPTEL	https://nptel.ac.in/courses/108108114
2	You tube videos on op-amps and in Linear Integrated Circuits.	https://www.youtube.com/watch?v=%E2%80%93

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain the basics of linear ICs.
CO2	Design circuits using linear ICs.
CO3	Demonstrate the application of Linear ICs.
CO4	Use ICs in the electronic projects

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	1	-	-	-	-	1	2	-	-
CO2	3	2	-	-	-	1	-	-	-	-	1	2	-	-
CO3	3	2	-	-	-	1	-	-	-	-	1	3	-	-
CO4	3	2	-	-	-	1	-	-	-	-	1	3	-	-
AVG	3	2	-	-	-	1	-	-	-	-	1	2.5	-	-

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

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5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

SENSORS AND TRANSDUCERS

Course Code	B24EE453	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To discuss need of transducers, their classification, advantages and disadvantages.
2. To discuss working of different types of transducers and sensors and recent trends in sensor technology and their selection.
3. To discuss basics of signal conditioning and signal conditioning equipment and configuration of Data Acquisition System and data conversion.
4. To discuss the basics of Data transmission and telemetry.
5. To explain measurement of various non-electrical quantities.

PREREQUISITES

Basic Electronics

MODULE #	TOPICS	Hours
1	Sensors and Transducers: Introduction, Classification of Transducers, Advantages and Disadvantages of Electrical Transducers, Transducers Actuating Mechanisms, Resistance Transducers, Variable Inductance Transducers, Capacitive Transducers, Piezoelectric Transducers, Hall Effect Transducers, Thermoelectric Transducers, Photoelectric Transducers	8
2	Sensors and Transducers (continued): Strain Gages, Load Cells, Proximity Sensors, Pneumatic Sensors, Light Sensors, Tactile Sensors, Fiber Optic Transducers, Digital Transducers, Recent Trends – Smart Pressure Transmitters, Selection of Sensors, Rotary – Variable Differential Transformer, Synchros and Resolvers, Induction Potentiometers, Micro Electromechanical Systems.	9
3	Signal Condition: Introduction, Functions of Signal Conditioning Equipment, Amplification, Types of Amplifiers, Mechanical Amplifiers Fluid Amplifiers, Optical Amplifiers, Electrical and electronic Amplifiers. Data Acquisition Systems and Conversion: Introduction, Objectives and Configuration of Data Acquisition System, Data Acquisition Systems, Data Conversion.	9
4	Data transmission & Actuators: Pneumatic and Hydraulic Actuation Systems- Actuation systems, Pneumatic and hydraulic systems, Directional Control valves, Pressure control valves, Cylinders, Servo and proportional control valves. Data Telemetry: Telemetry	8

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

5	Measurement of Non – Electrical Quantities: Pressure Measurement Temperature Measurement, Flow Measurement – Introduction, Electromagnetic Flow meters, Ultrasonic Flow Meters, Thermal Metes, Wire Anemometers. Measurement of Displacement, Measurement of Velocity/ Speed, Measurement of Acceleration, Measurement of Force, Measurement of Torque, Measurement of Shaft Power, Measurement of Liquid Level, Measurement of Viscosity.	8
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PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Electrical and Electronic Measurements and instrumentation	R.K Rajput	3rd	S. Chand	2013

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	A Course in Electronics and Electrical Measurements and Instruments	J.B. Gupta	13th	Katson Books	2008
2	A Course in Electrical and Electronic Measurements and Instrumentation	A. K. Sawheny	NA	Dhanpat Rai	2015

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Udemy	https://www.udemy.com/course/sensors-and-transducers/?srsltid=AfmBOooRUGJuQYB4s2G8DmF60krRWhUqUzO8iMe-whQF88WaekuXfcME
2	YouTube	https://www.youtube.com/watch?v=zxYeJW9v6OU&list=PLwymdQ84KI-w5DwDzqO_4hWsB2Jc4_eBy
3	E-Book	https://senofficial.yolasite.com/resources/sensors%20and%20transducers.pdf

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Classify the transducers and explain the need of transducers, their classification, advantages and disadvantages and working.
CO2	Outline the recent trends in sensor technology, working and their selection.
CO3	Analyze the signal conditioning and signal conditioning equipment and illustrate different configuration of Data Acquisition System and data conversion.
CO4	Discuss knowledge of data transmission and telemetry.
CO5	Explain measurement of non-electrical quantities -temperature, flow, speed, force, torque, power and viscosity.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	-	-	-	-	-	1	1	-
CO2	2	3	2	2	1	-	-	-	-	-	-	1	1	-
CO3	3	3	3	3	2	-	-	-	1	1	-	1	1	-
CO4	3	3	3	3	2	3	1	1	2	2	-	1	1	-
CO5	3	3	2	2	2	-	-	-	-	-	-	1	1	-
AVG	2.8	2.8	2.2	2.2	1.8	3	1	1	1.5	1.5	-	1	1	-

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

INTRODUCTION TO EV TECHNOLOGY

Course Code	B24EE454	Total contact hours / week	03	CIE MARKS	50
Course Category	ESC	Total SAAE hours / semester	48	SEE MARKS	50
L:T:P:S	3:0:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	03			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To understand the concept of electric vehicles.
2. To study about the motors & drives for electric vehicles.
3. To understand the electronics and sensors in electric vehicles.
4. To understand the concept of hybrid vehicles.
5. To study about fuel cell for electric vehicles.

PREREQUISITES

Basic Electrical Engineering Knowledge, Basic Understanding of Electric Motor Principles, Battery Technologies, Familiarity with different types of batteries, their chemistry, and charging methods, Knowledge of power conversion and control systems.

MODULE #	TOPICS	Hours
1	Introduction to Electric Vehicles: Electric Vehicle – Need - Types – Cost and Emissions – End of life. Electric Vehicle Technology – layouts, cables, components, Controls. Batteries – overview and its types. Battery plug-in and life. Ultra-capacitor, Charging – Methods and Standards. Alternate charging sources – Wireless & Solar.	8
2	Electric Vehicle Motors: Motors (DC, Induction, BLDC) – Types, Principle, Construction, Control. Electric Drive Trains (EDT) – Series HEDT (Electrical Coupling) – Power Rating Design, Peak Power Source (PPS); Parallel HEDT (Mechanical Coupling) – Torque Coupling and Speed Coupling. Switched Reluctance Motors (SRM) Drives – Basic structure, Drive Convertor, Design.	9
3	Electronics and Sensor-less control in EV: Basic Electronics Devices – Diodes, Thyristors, BJTs, MOSFETs, IGBTs, Convertors, Inverters. Safety – Risks and Guidance, Precautions, High Voltage safety, Hazard management. Sensors - Autonomous EV cars, Self drive Cars, Hacking; Sensor less – Control methods- Phase Flux Linkage-Based Method, Phase Inductance Based, Modulated Signal Injection. Mutually Induced Voltage-Based, Observer-Based.	9
4	Hybrid Vehicles: Hybrid Electric vehicles – Classification – Micro, Mild, Full, Plug-in, EV. Layout and Architecture – Series, Parallel and Series-Parallel Hybrid, Propulsion systems and components. Regenerative Braking, Economy, Vibration and Noise reduction. Hybrid Electric Vehicles System – Analysis and its Types, Controls.	8

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

5	Fuel Cells for Electric vehicles: Fuel cell – Introduction, Technologies & Types, Obstacles. Operation principles, Potential and I-V curve, Fuel and Oxidation Consumption, Fuel cell Characteristics – Efficiency, Durability, Specific power, Factors affecting, Power design of fuel Cell Vehicle and freeze capacity. Lifetime cost of Fuel cell Vehicle – System, Components, maintenance.	8
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PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Hybrid, Electric and Fuel Cell Vehicles	Jack Erjavec and Jeff Arias,	2 nd	Cengage Learning,	2012
2	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	Mehrdad Ehsani, Yimin Gao, Sebastien E. Gay and Ali Emadi	2 nd	CRC Press	2009

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Electric and Hybrid Vehicles: Design Fundamentals	Iqbal Husain	3 rd	CRC Press	2021
2	Modern Electric, Hybrid Electric, and Fuel Cell Vehicles	M. Ehsani, Y. Gao, S. Longo, and K. Ebrahimi	3 rd	CRC Press	2018

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Web links and Video Lectures (e-Resources)	https://archive.nptel.ac.in/courses/108/106/108106170/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
C01	Describe about working principle of electric vehicles.
C02	Explain the construction and working principle of various motors used in electric vehicles.
C03	Understand about working principle of electronics and sensor less control in electric vehicles.
C04	Describe the different types and working principle of hybrid vehicles.
C05	Illustrate the various types and working principle of fuel cells.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	3	3	-	-	-	1	-	-	-	-	1	3	-	-
C02	3	3	-	-	-	1	-	-	-	-	1	3	-	-
C03	3	3	-	-	-	1	-	-	-	-	1	2	-	-
C04	3	3	-	-	-	1	-	-	-	-	1	2	-	-
C05	3	3	-	-	-	1	-	-	-	-	1	3	-	-
AVG	3	3	-	-	-	1	-	-	-	-	1	2.6	-	-

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Lectures with discussions, question and answer sessions.
3. Informal quizzes.
4. Use of Video/Animation to explain functioning of various concepts.
5. Encourage collaborative (Group Learning) Learning in the class.
6. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
7. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
8. Introduce Topics in manifold representations.
9. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
10. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

BIOLOGY FOR ENGINEERS

Course Code	B24BOE46	Total contact hours / week	01	CIE MARKS	50
Course Category	BSC	Total SAAE hours / semester	16	SEE MARKS	50
L:T:P:S	1:0:0:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	1 hour

COURSE LEARNING OBJECTIVES**This course is intended to:**

1. To familiarize the students with the basic biological concepts and their engineering applications.
2. To enable the students with an understanding of bio design principles to create novel devices and structures.
3. To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
4. To motivate the students to develop interdisciplinary vision of biological engineering

PREREQUISITES

NIL

MODULE #	TOPICS	Hours
1	Introduction to Biology: The cell: The basic unit of life, Structure and functions of a cell. Plant Cell and animal cell, Prokaryotic and Eukaryotic cell, Stem cells and their application.	03
2	Biomolecules and Biosensors: Biomolecules: Properties and functions of carbohydrates, proteins, lipids. Short Biosensor History, Biosensor Classification.	03
3	Biochemical Components used in Biosensor Assemblies: Enzymes, Antibodies, Protein/Peptide Receptors, Nucleic Acids, Whole Cells as Biosensing Elements, Immobilization of Biochemical Elements of Biosensors.	03
4	Adaptation of Anatomical Principles: Brain as a CPU system. Eye as a Camera system. Heart as a pump system. Lungs as purification system. Kidney as a filtration system.	03
5	Biomimetics: Introduction, Echolocation (ultrasonography / ultrasound Imaging), Photosynthesis (photovoltaic cells, bionic leaf). Birds and insects (flight aerodynamics), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Shark skin (Friction reducing swimsuits), Kingfisher beak (Bullet train).	03

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Biology for Engineers	Rajendra Singh C and Rathnakar Rao N, Rajendra Singh C and Rathnakar Rao	NA	N Publishing, Bengaluru	2023
2	Human Physiology	Stuart Fox, Krista Rompolksi	16 th Edition	McGraw-Hill eBook	2022
3	Biosensors: essentials	Evtugyn, Gennady	Vol. 84	Springer Berlin Heidelberg	2014
4	Biomimetics: Nature-Based Innovation	Yoseph Bar-Cohen	1 st edition	CRC Press.	2012
5	Biomedical Instrumentation	Leslie Cromwell	NA	Prentice Hall	2011
6	Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies	D. Floreano and C. Mattiussi	NA	MIT Press	2008

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Wilson and Walker- Principles and Techniques of Biochemistry and Molecular Biology	Andreas Hofmann, Samuel Clokie	2018 Edition	NA	2018
2	3D Bioprinting: Fundamentals, Principles and Applications	Ibrahim Ozbolat	NA	Academic Press	2016
3	Biology for Engineers	Sohini Singh and Tanu Allen	NA	Vayu Education of India, New Delhi	2014
4	Biology for Engineers	Arthur T. Johnson	NA	CRC Press, Taylor and Francis	2011

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Online courses	https://nptel.ac.in/courses/121106008
2	Online courses	https://freevideolectures.com/course/4877/nptel-biology-engineers-other-nonbiologists
3	Online courses	https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-designspring-2009

4	Online courses	https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring2006
5	Online courses	https://www.coursera.org/courses?query=biology
6	Online courses	https://onlinecourses.nptel.ac.in/noc19_ge31/preview
7	Online courses	https://www.classcentral.com/subject/biology
8	Online courses	https://www.futurelearn.com/courses/biology-basic-concepts

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Interpret the components of a basic biological cell and their functions
CO2	Understand the principles of bioengineering sensors.
CO3	Compare the adaptation of anatomical principles in day-to-day engineering applications.
CO4	Relate the solution offered by nature to analogous engineering problems.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	3	-	-	3	-	-	-	3	2	-	-
CO2	3	3	3	3	-	-	3	-	-	-	3	2	-	1
CO3	3	3	3	3	-	-	3	-	-	-	3	2	-	1
CO4	3	3	3	3	-	-	3	-	-	-	3	2	-	1
AVG	3	3	3	3	-	-	3	-	-	-	3	2	-	1

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies which teachers can use to accelerate the attainment of the various course outcomes.

- 1) Explanation via real life problem, situation modelling, and deliberation of solutions, hands-on sessions, reflective and questioning /inquiry-based teaching.
- 2) Instructions with interactions in classroom lectures (physical/hybrid).
- 3) Use of ICT tools, including YouTube videos, related MOOCs, AR/VR/MR tools.
- 4) Flipped classroom sessions (~10% of the classes).
- 5) Industrial visits, Guests talks and competitions for learning beyond the syllabus.
- 6) Students' participation through audio-video based content creation for the syllabus (as assignments).
- 7) Use of gamification tools (in both physical/hybrid classes) for creative learning outcomes.
- 8) Students' seminars (in solo or group) /oral presentations.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- 1) Group Discussion of Case studies
- 2) Model Making and seminar/poster presentations
- 3) Design of novel device/equipment like Cellulose-based water filters, Filtration system

Assessment Details (both CIE and SEE):

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- 1) Two tests will be administered. Each test will be for 25 marks.
- 2) Questions will be based on multiple choice
- 3) Final CIE marks will be the sum total of both the tests.

Semester-End Examination:

- 1) Theory SEE will be conducted by the Office of COE with common question papers for the course (duration 01 hour).
- 2) The question paper will have fifty Multiple Choice questions
- 3) Max marks for SEE is 50

BASICS OF VHDL LAB

Course Code	B24EE471	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Simulate combinational circuits in data flow, behavioral, gate level abstractions & sequential circuits.
2. Use FPGA/CPLD kits for downloading Verilog codes and check output.
3. Simulate combinational circuits in data flow, behavioral, gate level abstractions.
4. Interface the hardware programmable chips and obtain the required output.

PREREQUISITES

Fundamental knowledge about computer systems, Basic knowledge of C Programming, Digital Circuits.

Exp. No.	TOPICS	Hours
1	<p>Write Verilog program for the following combinational design along with test bench to verify the design:</p> <ul style="list-style-type: none"> a) 2 to 4 decoder realization using NAND gates only (structural model) b) 8 to 3 encoder with priority encoder and without priority encoder (behavioral model) c) 8 to 1 Multiplexer using case statement and if statement 4 bit binary to gray code converter using 1 bit gray to binary converter 1 bit adder and subtractor. 	4
2	<p>Model in Verilog for a full adder and add functionality to perform logical operations of XOR, XNOR, AND and OR gates. Write test bench with appropriate input patterns to verify the modelled behavior.</p>	2
3	<p>Verilog 32 bit ALU shown in figure below and verify the functionality of ALU by selecting appropriate test patterns. The functionality of the ALU is shown in Table-1.</p> <ul style="list-style-type: none"> a) Write test bench to verify the functionality of the ALU considering all possible input patterns b) The enable signal will set the output to required functions if enabled, if disabled all the outputs are set to tri-state. c) The acknowledge signal is set high after every operation is complete. <div style="text-align: center;"> <pre> graph LR Opcode[Opcode(2:0)] --> ALU[32-bit ALU] A[A(31:0)] --> ALU B[B(31:0)] --> ALU Enable[Enable] --> ALU ALU --> Result[Result [32:0]] </pre> </div>	4

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

ALU Top Level Diagram Table -1 ALU functions:		
Opcode (2:0)	ALU Operation	Remarks
000	A + B	Addition of two numbers
001	A – B	Subtraction of two numbers
010	A + 1	Increment Accumulator by 1
011	A - 1	Decrement accumulator by 1
100	A	True
101	A Complement	Complement
110	A OR B	Logical OR
111	A AND B	Logical AND

4	Write Verilog code for SR, D and JK and verify the flip flop	2
5	Write Verilog code for 4 bit BCD asynchronous and synchronous counter	4
6	Write Verilog code for counter with given input clock and check whether it works as clock divider performing division of clock by 2, 4, 8 and 16 . Verify the functionality of the code.	4
PART B		
Interface all experiments using XILIX VIVADO Software and FPGA Design Kit		
7	Write a Verilog code to design a clock divider circuit that generates ½, 1/3rd, 1/4th ,clock from given input clock . Port the design to FPGA and validate the functionality through CRO.	2
8	Interface a DC motor to FPGA and write Verilog code to change its speed and direction	2
9	Interface a stepper motor to FPGA and write Verilog code to control the speed and direction of stepper motor.	2
10	Interface a DAC to FPGA and write Verilog code to generate a sine, Square, Ramp and Down Ramp wave with frequency f KHz, ex f = 100 KHz, or 200 KHz etc, . Modify the code to down sample the frequency to f/2 KHz. Display the original and down sampled signals by connecting them to CRO.	4

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	HDL Programming VHDL and Verilog	Nazeih M Botros	1st	Dreamtech press	2009
2	Verilog HDL: A Guide to Digital Design and Synthesis	Samir Palnitkar	2nd	Pearson education	2015

REFERENCE BOOKS:

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of HDL	Cyril P R	1st	Pearson/Sanguine /	2010
2	Digital system	Mark	2nd	Easy engineering	2010

	Design using VHDL	Zwolinski			
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E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Online Course	https://vhdlwhiz.com/basic-vhdl-tutorials/
2	Online Course materials	https://www.udemy.com/course/fpgavhdl

COURSE OUTCOMES:

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

CO#	Course Outcome Statement
CO1	Able to write the VHDL/Verilog programs to simulate combinational circuits in data flow, behavioral, gate level abstractions.
CO2	Able to describe sequential circuits like flip-flops, counters, in behavioral descriptions and obtain simulated waveforms.
CO3	Able to use FPGA/CPLD kits for downloading Verilog codes and check output.
CO4	Able to synthesize combinational and sequential circuits on programmable ICs and test the hardware.
CO5	Able to interface the hardware programmable chips and obtain the required output.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	-	-	2	1	-	2	1	2	-
CO2	2	-	-	-	2	-	-	2	1	-	2	2	2	-
CO3	2	-	-	-	2	-	-	2	1	-	2	2	2	-
CO4	2	-	-	-	2	-	-	2	1	-	2	2	2	-
CO5	2	-	-	-	2	-	-	2	1	-	2	2	2	-
AVG	2	-	-	-	2	-	-	2	1	-	2	1.8	2	-

Teaching-Learning Process

Pedagogy (General Instructions):

Programming can be done using any compiler. Download the programs on a FPGA/CPLD board and performance testing may be done using 32 channel pattern generator and logic analyser, apart from verification by simulation with tools such as Altera/Modelsim or equivalent.

PCB DESIGN USING OrCAD/ANY OTHER TOOL

Course Code	B24EE472	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Understand the Fundamentals of PCB Design and Fabrication
2. Translate Schematics into PCB Layouts using Design Software
3. Verify and Validate PCB Designs for Manufacturability and Functionality

PREREQUISITES

Basic Analog Electronics, Basic Digital Electronics, Circuit Theory and Basic Software Usage

Exp. No.	TOPICS	Hours
1	NEED FOR PCB, TYPES OF PCBs : Single and Multilayer, Technology: Plated Through Hole, Surface Mount, PCB Material, Electronic Component packaging, PCB Designing, Fabrication, Electronic Design Automation Tools: Proteus, OrCAD or any other tool.	10
2	INTRODUCTION TO PROTEUS, OrCAD OR ANY OTHER TOOL: Schematic entry / drawing, netlisting, layering, component foot print library selection & designing, design rules, component placing: Manual & automatic, track routing: automatic & manual, rules: track length, angle, joint & size, Auto router setup. Design Rules.	10
3	PCB DESIGNING PRACTICE: PCB Designing of Basic and Analog Electronic Circuits, PCB Designing of Power Supplies.	4
4	POST DESIGNING & PCB FABRICATION PROCESS: Printing the Design, Etching, Drilling, Interconnecting and Packaging electronic Circuits, Gerber Generation, Soldering and De-soldering, Component Mounting, PCB and Hardware Testing.	6

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Introduction To PSpice Using OrCAD For Circuits And Electronics	Rashid, Muhammad H	3 rd	Pearson/Prentice Hall	2015

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Cadence PCB Design & Analysis Resources (Official Portal)	https://resources.pcb.cadence.com/
2	EMA Design Automation - OrCAD Walkthrough & Training	https://www.ema-eda.com/learning/training-overview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the fundamental principles of PCB design, materials, and fabrication processes.
CO2	Create and translate electronic circuit schematics into initial PCB layouts using the chosen design software.
CO3	Apply best practices for component placement and multi-layer routing to optimize PCB performance and manufacturability
CO4	Verify and validate PCB designs using Design Rule Checks (DRC), Electrical Rule Checks (ERC), and generate appropriate fabrication and assembly documentation.

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
CO1	2	1	-	-	-	-	-	-	-	-	1	2	2	1
CO2	2	2	2	-	3	-	-	1	1	-	1	2	2	1
CO3	3	2	2	-	3	-	-	1	1	-	1	3	2	1
CO4	2	3	2	-	3	1	-	1	2	1	1	2	2	1
AVG	2.25	2	2	-	3	1	-	1	1.33	1	1	2.25	2	1

Teaching-Learning Process

Pedagogy (General Instructions):

Hands-on Lab Sessions / Guided Practice, Demonstrations, Interactive Problem Solving / Q&A Sessions and Project-Based Learning

IoT LAB

Course Code	B24EE473	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. Implement the state of the Architecture of an IoT
2. Understand design methodology and hardware platforms involved in IoT
3. Understand how to analyse and organize the data.
4. Compare IOT Applications in Industrial & real world

PREREQUISITES

C-programming concepts

Exp. No.	TOPICS	Hours
1	Controlling the Light Emitting Diode (LED) with a push button.	2
2	Interfacing the RGB LED with the Arduino.	4
3	Controlling the LED blink rate with the potentiometer interfacing with Arduino.	2
4	Detection of the light using photo resistor. And interfacing temperature sensor.	2
5	Interfacing Servo Motor/ Stepper Motor / DC Motor with the Arduino.	4
6	Interfacing of the Active Buzzer and relay with Arduino.	2
7	Building Intrusion Detection System with Arduino and Ultrasonic Sensor	2
8	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.	4
9	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '_1'/'0' is received from smartphone using Bluetooth	4
10	Interface of Camera using ESP32 Module.	4

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of	Rob Barton and Jerome Henry	3	Cisco Press	2017

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete,				
2	Internet of Things – A hands-on approach,	Arshdeep Bahga, Vijay Madiseti	2	NA	2019

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Internet of Things: Architecture, Design Principles And Applications,	Rajkamal	3	McGraw Hill Higher Education	2020
2	Introduction to IoT	S. Misra, C. Roy, and A. Mukherjee	2	Cambridge University Press	2020

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	YouTube	https://onlinecourses.nptel.ac.in/noc22_cs53/preview
2	YouTube	https://archive.nptel.ac.in/courses/108/108/108108123/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the concept of Internet of Things and its Software
CO2	Implement interfacing of various sensors with Arduino/Raspberry Pi.
CO3	Demonstrate the ability to transmit data wirelessly between different devices.
CO4	Show an ability to upload/download sensor data on cloud and server.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	-	-	2	3	-	-	-	1	3	2	-	-
CO2	3	3	-	-	2	3	-	-	-	1	3	2	-	-
CO3	3	3	-	-	2	3	-	-	-	1	3	2	-	-
CO4	3	3	-	-	2	3	-	-	-	1	3	2	-	-
AVG	3	3	-	-	2	3	-	-	-	1	3	2	-	-

MATLAB FOR ELECTRICAL AND ELECTRONIC MEASUREMENTS

Course Code	B24EE474	Total contact hours / week	02	CIE MARKS	50
Course Category	AEC	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To design and analyse measurement of resistance and inductance using various bridges.
2. To design and analyse measurement of frequency, energy, power and flux in AC circuits.
3. To test and analyse current transformer, voltage transformer, Q meter and voltmeters.

PREREQUISITES

Basic Electrical Engineering

Exp. No.	TOPICS	Hours
1	Design and analysis of measurement of resistance using Wheatstone and Kelvin's Double bridge.	4
2	Measurement of electrical parameters in a series R-L-C circuit in various combinations.	6
3	Design and Analysis of measurement of frequency in single and three-phase circuits.	4
4	Design and Analysis of measurement of flux and flux density.	4
5	Design and Analysis of measurement of Energy in three-phase circuits.	2
6	Design and Analysis of measurement of Real power, Reactive power and Power Factor in three-phase circuits.	2
7	Testing and Analysis of Current Transformer using Silsbee's Deflection Method.	2
8	Testing and Analysis of Voltage Transformer using Silsbee's Deflection Method.	2
9	Testing and Analysis of True RMS reading Voltmeters.	2
10	Design and Analysis of Integrating type Digital Voltmeters.	2

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	A Course in Electrical and Electronic Measurements	A K Sawheny	19 th	Dhanpat Rai & Co.	2011
2	A Course in Electrical and Electronic Measurements	J B Gupta	NA	Katson Books	2013

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Electrical and Electronic Measurements and Instrumentation	R K Rajput	5 th	S Chand	2012
2	Electrical Measuring Instruments and Measurements	S C Bhargava	NA	B S Publication	2013

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Video lectures	https://archive.nptel.ac.in/courses/108/105/108105153/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Design and analyse measurement of resistance and inductance using various bridges using MATLAB.
CO2	Design and analyse measurement of energy, real Power, reactive power and power factor in three phase circuits using MATLAB.
CO3	Design and analyse measurement of frequency, flux and flux density in single phase and three-phase circuits using MATLAB.
CO4	Test and analyse current transformer, voltage transformer and True RMS reading voltmeters using MATLAB.
CO5	Design and Analyse Digital Voltmeters and Q meters using MATLAB.

CO-PO-PSO Mapping

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

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Encourage collaborative (Group Learning) Learning in the class.
2. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
3. Adopt Problem Based Learning (PBL), which fosters students 'Analytical skills develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
4. Introduce Topics in manifold representations.
5. Show the different ways to solve the same problem with different circuits / logic and encourage the students to come up with their own creative ways to solve them.
6. Discuss how every concept can be applied to the real world and when that's possible, it helps improve the students' understanding.

UNIVERSAL HUMAN VALUES

Course Code	B24UHK48	Total contact hours / week	01	CIE MARKS	100
Course Category	UHV	Total SAAE hours / semester	16	SEE MARKS	-
L:T:P:S	1:0:0:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	-

COURSE LEARNING OBJECTIVES

This course is intended to:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
4. This course is intended to provide a much-needed orientation input in value education to the young enquiring minds.

PREREQUISITES

NIL

MODULE #	TOPICS	Hours
1	Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations	3
2	Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	3
3	Harmony in the Family and Society: Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	3

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

4	Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence	3
5	Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession	3

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G P Bagaria	2nd Revised	Excel Books, New Delhi	2019
2	The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Asthana, G	NA	NA	NA

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Jeevan Vidya: Ek Parichaya	A Nagaraj	NA	Jeevan Vidya Prakashan, Amar kantik	1999
2	Human Values	A.N. Tripathi	NA	New Age Intl. Publishers, New Delhi	2004
3	Foundations of Ethics and Management	B P Banerjee	NA	Excel Books	2005

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Online resource	https://www.uhv.org.in/uhv-ii
2	Online resource	http://uhv.ac.in
3	Online resource	http://www.uptu.ac.in
4	You tube link	https://www.youtube.com/watch?v=8ovkLRYXlJE
5	You tube link	https://www.youtube.com/watch?v=OgdNx0X923I

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO2	They would have better critical ability.
CO3	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
CO4	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Expected to positively impact common graduate attributes like:

- 1) Ethical human conduct
- 2) Socially responsible behaviour
- 3) Holistic vision of life
- 4) Environmentally responsible work
- 5) Having Competence and Capabilities for Maintaining Health and Hygiene
6. Appreciation and aspiration for excellence (merit) and gratitude for all

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	3	3	-	3	-	-	3
CO2	-	-	-	-	-	-	-	3	3	-	3	-	-	3
CO3	-	-	-	-	-	-	-	3	3	-	3	-	-	3
CO4	-	-	-	-	-	-	-	3	3	-	3	-	-	3
AVG	-	-	-	-	-	-	-	3	3	-	3	-	-	3

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies which teachers can use to accelerate the attainment of the various course outcomes.

- 1) The methodology of this course is exploration based and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
- 2) In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied skills.
- 3) State the need for UHV activities and its present relevance in the society and Provide real-life examples.
- 4) Support and guide the students for self-study activities.
- 5) You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- 6) This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
- 7) Encourage the students for group work to improve their creative and analytical skills.

Assessment Details (only CIE):

Continuous Internal Evaluation:

1. Two tests will be administered. Each test will be for 50 marks.
2. Questions will be based on multiple choice
3. Final CIE marks will be the sum total of both the tests.
4. The minimum passing mark for the CIE is 40% of the maximum marks (40 marks out of 100)

PYTHON PROGRAMMING FOR ELECTRICAL ENGINEERS

Course Code	B24EEL49	Total contact hours / week	02	CIE MARKS	50
Course Category	PCCL	Total SAAE hours / semester	00	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	01			Exam Duration	3 hours

COURSE LEARNING OBJECTIVES

1. To develop Python programs with conditionals, loops, and functions, data structures, lists, tuples, dictionaries.
2. To develop Python programs for problem solving and analysis in the field of Electrical Engineering.
3. To develop the python program Electrical/ Electronic network, Logic circuits and machines parameters using Python.
4. To develop model using Python program knowledge.

PREREQUISITES

Fundamental knowledge about computer systems, Basic knowledge of C Programming, Basic Electrical Engineering ,Electrical Circuit Analysis, Analog and Digital Circuits

Exp. No.	TOPICS	Hours
	PART A-Introduction	
	Python Programs on Data Types	2
	Python Programs on Decision Making and Loops	2
	Python Programs on Data Structures(List, tuple, dictionary), strings	4
	Python Programs on Modules	2
	PART B	
1	Write a program to perform analysis of Rectifier Circuit	2
2	Write a program to perform analysis of oscillator Circuit	2
3	Write a program to perform analysis of Low pass and high pass Filter Circuits.	2
4	Write a program to perform DC Analysis using Pyspice.	2
5	Develop a python code to design and realize Combinational/Sequential logic circuits.	2
6	Write a program to control the speed of direction stepper/DC Motor.	2
7	Write a program to PWM Signal Generator and Visualizer.	2
8	Write a python code to calculate of the equivalent circuit parameters and plot the efficiency of a Transformer at different loads.	2
9	Write a program to simulate Solar Panel I-V characteristics.	2
10	Write a program to simulate Battery Charging/Discharging characteristics.	2

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Introduction to programming using Python	Y. Daniel Liang	1 st	Pearson Publications	2017
2	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	2 nd	Green Tea Press	2015
3	Python for Everybody: Exploring Data Using Python 3	Charles R. Sperance	1 st	Create Space Independent Publishing Platform	2016

REFERENCE BOOKS:

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	MicroPython for the Internet of Things (A Beginner's guide to programming with Python on microcontrollers)	Charles Bell	1 st	A Press	2017
2	MicroPython for ESP8266 Development Workshop	Agus Kurniawan	1 st	PE Press	2016
3	Python Programming using problem solving approach	Reema Thareja	1 st	Oxford university press	2017

E-Resources: E-books / Online Course materials / Online Courses / Video Lectures:

Sl. #	Type of E-Resource	URL
1	Online Course materials	https://www.learnbyexample.org/python/
2	Online Course materials	https://www.learnpython.org/
3	Online Course materials	https://pythontutor.com/visualize.html#mode=edit

COURSE OUTCOMES:

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

CO#	Course Outcome Statement
C01	Develop programs with different data types utilizing loops, decision-making statements, and functions.
C02	Evaluate characteristics of the machines and transformer parameters using Python.
C03	Perform linear circuit analysis using Python Module.
C04	Develop a python code to design and realize logic circuits
C05	Develop a model based on the basic of knowledge

CO-PO-PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PS01	PS02	PS03
C01	2	-	-	-	2	-	-	2	1	1	2	1	2	-
C02	2	-	-	-	2	-	-	2	1	1	2	2	2	-
C03	2	-	-	-	2	-	-	2	1	1	2	2	2	-
C04	2	-	-	-	2	-	-	2	1	1	2	2	2	-
C05	2	-	2	-	2	-	-	2	1	1	2	2	2	-
AVG	2	-	2	-	2	-	-	2	1	1	2	2	2	-

Teaching-Learning Process

Pedagogy (General Instructions):

Programming can be done using any compiler, Download the program PySpice for executing of python based programs.

NATIONAL SERVICE SCHEME (NSS) – I, II, III & IV

Course Code	B24NSKxxx	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

COURSE LEARNING OBJECTIVES

National Service Scheme (NSS) will enable the students to:

- 6) Understand the community in general in which they work.
- 7) Identify the needs and problems of the community and involve them in problem –solving.
- 8) Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
- 9) Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
- 10) Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

General Instructions - Pedagogy

These are sample strategies; which teachers can use to accelerate the attainment of the various course outcomes.

- 6) In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills.
- 7) State the need for NSS activities and its present relevance in the society and Provide real-life examples.
- 8) Support and guide the students for self-planned activities.
- 9) You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- 10) Encourage the students for group work to improve their creative and analytical skills.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

Sl. #	CONTENTS
1	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
2	Waste management- Public, Private and Govt organization, 5 R's.
3	Setting of the information imparting club for women leading to contribution in social and economic issues.
4	Water conservation techniques – Role of different stakeholders– Implementation.
5	Preparing an actionable business proposal for enhancing the village income and approach for implementation.
6	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.
7	Developing Sustainable Water management system for rural areas and implementation approaches.
8	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swatch Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.
9	Spreading public awareness under rural outreach programs.(minimum5 programs).
10	Social connect and responsibilities.
11	Plantation and adoption of plants. Know your plants.
12	Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).
13	Govt. school Rejuvenation and helping them to achieve good infrastructure.
NOTE:	
3) Student/s in individual or in a group Should select any one activity in the beginning of each semester till end of that respective semester for successful completion as per the instructions of NSS officer with the consent of HOD of the department.	
4) At the end of every semester, activity report should be submitted for evaluation.	

Semester	Sl. #	TOPICS TO BE COVERED
3rd Sem B24NSK391	1	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
	2	Waste management- Public, Private and Govt organization, 5 R's.
	3	Setting of the information imparting club for women leading to contribution in social and economic issues.
4th Sem B24NSK410	4	Water conservation techniques – Role of different stakeholders– Implementation.
	5	Preparing an actionable business proposal for enhancing the village income and approach for implementation.
	6	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.
5th Sem B24NSK591	7	Developing Sustainable Water management system for rural areas and implementation approaches.
	8	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swatch Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	9	Spreading public awareness under rural outreach programs. (minimum 5 programs).
	10	Social connect and responsibilities.
6th Sem B24NSK691	11	Plantation and adoption of plants. Know your plants.
	12	Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).
	13	Govt. school Rejuvenation and helping them to achieve good infrastructure.

Suggested Learning Resources

- 4) NSS Course Manual, Published by NSS Cell, VTU Belagavi.
- 5) Government of Karnataka, NSS cell, activities reports and its manual.
- 6) Government of India, NSS cell, Activities reports and its manual.

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the importance of his / her responsibilities towards society.
CO2	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
CO4	Implement government or self-driven projects effectively in the field.
CO5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO4	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO5	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Plan of Action (Execution of Activities for each semester)

SL. #	Practice Session Description
1	Lecture session by NSS Officer
2	Students Presentation on Topics
3	Presentation - 1 , Selection of topic, PHASE - 1
4	Commencement of activity and its progress - PHASE - 2

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

5	Execution of Activity
6	Execution of Activity
7	Execution of Activity
8	Execution of Activity
9	Execution of Activity
10	Case study based Assessment, Individual performance
11	Sector wise study and its consolidation
12	Video based seminar for 10 minutes by each student At the end of semester with Report.

- In every semester from 3rd semester to 6th semester, each student should do activities according to the scheme and syllabus.
- At the end of every semester student performance has to be evaluated by the NSS officer for the assigned activity progress and its completion.
- At last in 6th semester consolidated report of all activities from 3rd to 6th semester, compiled report should be submitted as per the instructions.

Assessment Details for CIE

Weightage	CIE - 100%	Implementation strategies of the project (NSS work). 1) The last report should be signed by NSS Officer, the HOD and principal. 2) At last report should be evaluated by the NSS officer of the institute. 3) Finally the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.
Presentation - 1 Selection of topic, PHASE - 1	10 Marks	
Commencement of activity and its progress - PHASE - 2	10 Marks	
Case study based Assessment Individual performance	10 Marks	
Sector wise study and its consolidation	10 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report.	10 Marks	
Total marks for the course in each semester	50 Marks	

Marks scored for 50 by the students should be Scale down to 25 marks In each semester for CIE entry in the portal.

25 marks CIE entry will be entered in IA marks portal at the end of each semester 3rd to 6th sem, Report and assessment copy should be made available in the department semester wise.

Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general.

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

Pedagogy – Guidelines: It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl. #	Topic	Group Size	Location	Activity Execution	Reporting	Evaluation of the topic
1	Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.	May be individual or team	Farmers land / Villages / roadside / community area/ College campus etc...	Site selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics Of scheme and syllabus by NSS officer
2	Waste management- Public, Private and Govt organization, 5 R's.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Site selection / proper consultation / Continuous monitoring / Information board		
3	Setting of the information imparting club for women leading to contribution in social and economic issues.	May be individual or team	Women empowerment groups / Consulting NGOs & Govt Teams / College campus etc...	Group selection / proper consultation / Continuous monitoring / Information board		
4	Water conservation techniques – Role of different stakeholders– Implementation.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc...	Site selection / proper consultation / Continuous monitoring / Information board		
5	Preparing an actionable business proposal for enhancing the village income and approach for implementation.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc...	Group selection / proper consultation / Continuous monitoring / Information board		
6	Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.	May be individual or team	Local government / private / aided schools / Government Schemes officers / etc.....	School selection / proper consultation / Continuous monitoring / Information board		
7	Developing Sustainable Water management system for rural areas and	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers /	Site selection / proper consultation / Continuous monitoring / Information board		

SEMESTER 3 & 4 SYLLABUS (Academic Year: 2025-2026)

	implementation approaches.		campus etc.....			
8	Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Group selection / proper consultation / Continuous monitoring / Information board		
9	Spreading public awareness under rural outreach programs. (minimum 5 programs). /// Social connect and responsibilities.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Group selection / proper consultation / Continuous monitoring / Information board		
10	Plantation and adoption of plants. Know your plants.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Place selection / proper consultation / Continuous monitoring / Information board		
11	Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Place selection / proper consultation / Continuous monitoring / Information board		
12	Govt. school Rejuvenation and helping them to achieve good infrastructure.	May be individual or team	Villages / City Areas / Grama panchayat / public associations / Government Schemes officers / campus etc.....	Place selection / proper consultation / Continuous monitoring / Information board		

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – I

Course Code	B24PEK391	Course Category	NCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Orientation D) Lifestyle E) Health & Wellness F) Pre-Fitness test.	4 Hours
2	General Fitness & Components of Fitness D) Warming up (Free Hand exercises) E) Strength – Push-up / Pull-ups F) Speed – 30 Mtr Dash	4 Hours
3	Specific games (Any one to be selected by the student) 3) Kabaddi – Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus. 4) Kho-Kho – Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.	16 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
C01	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness
C02	Familiarization of health-related Exercises, Sports for overall growth and development
C03	Create a foundation for the professionals in Physical Education and Sports
C04	Participate in the competition at regional /state / national / international levels.
C05	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.
C06	Understand and practice of Traditional Games

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C02	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C03	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C04	-	-	-	-	-	3	3	3	3	3	3	-	-	2
C05	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – II

Course Code	B24PEK410	Course Category	NCCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Ethics and Moral Values C) Ethics in Sports D) Moral Values in Sports and Games	4 Hours
2	Specific Games (Any one to be selected by the student) C) Volleyball – Attack, Block, Service, Upper Hand Pass and Lower hand Pass. D) Athletics (Track Events) – Any event as per availability of Ground.	16 Hours
3	Role of Organisation and administration	4 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the ethics and moral values in sports and athletics
CO2	Perform in the selected sports or athletics of student's choice.
CO3	Understand the roles and responsibilities of organisation and administration of sports and games.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – III

Course Code	B24PEK591	Course Category	NCCM	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Orientation C) Fitness D) Food & Nutrition	4 Hours
2	General Fitness & Components of Fitness D) Agility – Shuttle Run E) Flexibility – Sit and Reach F) Cardiovascular Endurance – Harvard step Test	4 Hours
3	Specific games (Any one to be selected by the student) 3) Badminton (Fore hand low/high service, back hand service, smash, drop) 4) Basketball (Dribbling, passing, shooting etc.) 3. Athletics (Field events – Throws)	16 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
C01	Understand the fundamental concepts and skills of Physical Education, Health, Food, Nutrition and general fitness
C02	Familiarization of health-related Exercises, Sports for overall growth and development
C03	Create a foundation for the professionals in Physical Education and Sports
C04	Participate in the competition at regional/state / national / international levels.
C05	Understand and practice of specific games and athletic throwing events.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO4	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO5	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – IV

Course Code	B24PEK691	Course Category	NCCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	Orientation 3) Postural deformities. 4) Stress management	4 Hours
2	Specific Games (Any one to be selected by the student) 4) Throw ball 5) Table Tennis 6) Athletics (Field Events- Jumps) – Any event as per availability of Ground.	16 Hours
3	Aerobics	4 Hours

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the Postural deformities and Stress management in sports and athletics
CO2	Participate in the competition at regional/state / national / international levels.
CO3	Understand and practice of specific games and athletic Jumping events.
CO4	Understand and practice of Aerobics.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO2	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO3	-	-	-	-	-	3	3	3	3	3	3	-	-	2
CO4	-	-	-	-	-	3	3	3	3	3	3	-	-	2
AVG	-	-	-	-	-	3	3	3	3	3	3	-	-	2

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

YOGA – I

Course Code	B24YOK391	Course Category	NCCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Introduction of Yoga, Aim and Objectives of yoga, Prayer Brief introduction of yogic practices for common man Rules and regulations Misconceptions of yoga	Yoga, its meaning, definitions. Different schools of yoga, importance of prayer Yogic practices for common man to promote positive health Rules to be followed during yogic practices by practitioner Yoga its misconception	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar prayer and its meanitrg, Need, importance and benefits of Suryanamaskar 12 count, 2 rounds	
Different types of Asanas a) Sitting 1. Padmasana 2. Vajrasana b) Standing 1. Vrikshana 2. Trikonasana c) Prone line 1. Bhujangasana 2. Shalabhasana d) Supine line 1. utthitadvipadasana 2. Ardhalasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits of each asana	

YOGA – II

Course Code	B24YOK410	Course Category	NCCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Patanjali's Ashtanga Yoga 1. Yama 2. Niyama	Patanjali's Ashtanga Yoga. Yama: Ahimsa, satya, asteya, brahm acarya, aparigraha Niyama: shoucha, santosh, tapa svaadhyaya, Eshvarapranidhan	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar l2 count 4 rounds	
Different types of Asanas a) Sitting 1. Sukhasana 2. Paschimottanasana b) Standing 1. Ardhakati Chakrasana 2. Parshva Chakrasana c) Prone line 1. Dhanurasana d) Supine line 1. Halasana 2. Karna Peedasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits each asana	
Kapalabhati	Meaning, importance and benefits of Kapalabhati. 40 strokes/min 3 rounds	
Pranayama – 1. Suryanuloma -Viloma 2. Chandranuloma-Viloma 3. Suryabhedana 4. Chandra Bhedana 5. Nadishodhana	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

YOGA – III

Course Code	B24YOK591	Course Category	NCCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Patanjali's Ashtanga Yoga 3. Asana 4. Pranayama 5. Pratyahara	Patanjali's Ashtanga Yoga – its need and importance	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar 12 count 6 rounds	
Different types of Asanas a) Sitting 1. Ardha Ushtrasana 2. Vakrasana 3. Yogamudra in Padmasana b) Standing 1. UrdhvaHastothanasana 2. Hastapadasana 3. ParivrittaTrikonasana 4. Utkatasana c) Supine line 1. Sarvangasana 2. Chakraasana 3. Pavanamuktasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits each asana	
Kapalabhati	Revision of practice. 60 strokes/min 3 rounds	
Pranayama – 1. Ujjayi 2. Sheetali 3. Sheektari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

YOGA – IV

Course Code	B24YOK691	Course Category	NCCMC	Exam Duration	-
L:T:P:S	0:0:2:0	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Course Title	Content	No. of Hours
Patanjali's Ashtanga Yoga 1. Dharana 2. Dhyana (Meditation) 3. Samadhi	Patanjali's Ashtanga Yoga – its need and importance	Total 20-24 hrs 2 hrs per week
Suryanamaskara	Suryanamaskar l2 count 8 rounds	
Different types of Asanas a) Sitting 1. Bakasana 2. Hanumanasana 3. Ekapada Rajakapotasana 4. Yogamudra in Vajrasana b) Standing 1. Vatayanasana 2. Garudasana c) Balancing 1. Veerabhadrasana 2. Sheershasana	Asana, Need, importance of Asana. Different types of asana. Asana its meaning by name, technique, precautionary measures and benefits each asana	
Kapalabhati	Revision of Kapalabhati practice. 80 strokes/min 3 rounds	
Pranayama – 1. Bhastrika 2. Bhramari	Meaning, Need, importance of Pranayama. Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama	

Scheme and Assessment for auditing the course and Grades:

SL #	Activity	Marks
1	Participation of student in all the modules	20
2	Quizzes – 2, each of 15 marks	30
3	Final presentation / exhibition / Participation in competitions/ practical on specific tasks assigned to the students	50
TOTAL		100

READY TO RISE

Course Code	B24SDC411	Course Category	AC	Exam Duration	-
L:T:P:S	0:0:0:2	Total contact hours / week	02	Total credits	0
CIE MARKS	100	SEE MARKS	-	TOTAL MARKS	100

Module #	CONTENTS	DURATION
1	<p>Aptitude Training</p> <p>A) Quantitative Aptitude: Focus on basics like percentages, ratios, averages, time-speed-distance, and profit & loss.</p> <p>B) Logical Reasoning: Introduce puzzles, syllogisms, number series, and basic data interpretation.</p> <p>C) Verbal Ability: Emphasize vocabulary building, grammar, sentence correction, and comprehension.</p>	6 Hours
2	<p>Communication Skills: Enhance verbal and written communication through activities like debates and presentations.</p> <p>Teamwork: Engage in group projects to foster collaboration.</p> <p>Time Management: Workshops on prioritizing tasks and meeting deadlines.</p>	6 Hours

Suggested Resources:

- Books like *Quantitative Aptitude For Competitive Examinations* by R.S. Aggarwal.
- Online platforms such as GeeksforGeeks, lofoya and IndiaBix for practice questions.

Suggested Activities:

- Participate in student clubs or societies to practice interpersonal skills.
- Attend workshops or seminars on effective communication.

Evaluation:

2-Internal Tests along with regular subjects (MCQs with OMR Sheets)
Weekly online assessments