

DON BOSCO INSTITUTE OF TECHNOLOGY, BANGALORE

(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 ELECTRONICS AND COMMUNICATION ENGINEERING

UNDERGRADUATE PROGRAM

(NBA Accredited 2025-2028)

OUTCOME BASED CURRICULUM & ASSESSMENT

Scheme and Syllabus

III and 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

To nurture and disseminate the body of knowledge in the field of electronics and communication engineering along with ethical values to serve the society globally.

Mission of the Department

M1: To impart knowledge through teaching learning process that builds strong concepts in Electronics and Communication Engineering.

M2: To inculcate technical, professional, managerial and leadership skills.

M3: To nurture students to provide sustainable solutions keeping environmental considerations and ethical practices.

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	
PS01	Ability to analyze and design electronic components and subsystems in the areas of communication and signal processing.
PS02	Ability to design embedded systems and VLSI circuits to realize products for societal needs using relevant tools and technologies.
PS03	To inculcate managerial skills with ethical and human values for a sustainable society.

Program Educational Objectives

PEO1	Graduates shall be able to employ the acquired engineering knowledge for technological development and management.
PEO2	Graduates shall be able to exhibit Life-long learning acquired through specialized technical training, higher education and professional activities.
PEO3	Graduates shall be able to solve engineering issues from a broader social perspective for contributing to the needs of the society.

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
Mandatory Non Credit Courses	MNC
Audit Course	AC

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DON BOSCO INSTITUTE OF TECHNOLOGY
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Department of Electronics and Communication 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	PCC/BSC	B24MAT31D	Fourier series, transforms and Probability distribution	BS	MAT	3:0:0:0	48	03	50:50	100	3
2	IPCC	B24EC32	Analog Electronic Circuits	ECE	ECE	3:0:2:0	48	03	50:50	100	4
3	IPCC	B24EC33	Digital System Design Using Verilog	ECE	ECE	3:0:2:0	48	03	50:50	100	4
4	PCC	B24EC34	Network Analysis	ECE	ECE	2:2:0:0	32	03	50:50	100	3
5	ESC	B24EC35x	ESC / ETC /PLC	ECE	ECE	3:0:0:0	48	03	50:50	100	3
6	UHV	B24SCK36	Social Connect and Responsibility	Any Dept.	CS	0:0:2:0	00	-	100:0	100	0
7	AEC / SEC	B24EC37x	Ability Enhancement Course / Skill Enhancement Course	ECE	ECE	If Theory 1:0:0:0	16	01	50:50	100	1
						If Lab 0:0:2:0	00	03			
8	PCCL	B24ECL38	Verilog HDL Laboratory	ECE	ECE	0:0:2:0	-	03	50:50	100	1
9	NCMC	B24NSK391	National Service Scheme (NSS)-I	NSS Coordinator		0:0:2:0	00	-	100:0	100	0
		B24PEK391	Physical Education (PE) (Sports and Athletic)-I	PE Director							
		B24YOK391	Yoga-I	Yoga Teacher							
TOTAL									550:350	900	19

Dept. Member Convenor

Head of the Department

Dean – Academic

Principal

PCC: Professional Core Course, **PCCL:** Professional Core Course laboratory, **UHV:** Universal Human Value Course, **NMC:** Mandatory Course (Non-credit), **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. **ESC:** Engineering Science Course, **ETC:** Emerging Technology Course, **PLC:** Programming Language Course

Engineering Science Courses (ESC/ETC/PLC) (Note- Student should opt for the course which should not be similar to the course opted in 1st Year

B24EC351	Programming in C++	B24EC353	Computer Organization and Architecture
B24EC352	Sensors and Instrumentation	B24EC354	Industrial Electronics

Ability Enhancement Courses

B24EC371	Programming in C++ Laboratory	B24EC373	IOT System Design
B24EC372	MATLAB Programming	B24EC374	LABVIEW programming

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical's of the same course. Credit for IPCC can be 04 and its Teaching Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). 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.) 2022-23 may please be referred.

National Service Scheme (NSS) / Physical Education (PE) (Sports and Athletics) / Yoga:

- (1) 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.
- (2) Activities shall be carried out between III semester to the VI semester (for 4 semesters).
- (3) The candidate has to secure minimum of 40% of maximum marks of CIE to qualify in this course
- (4) The candidate may continue the same chosen course (NSS/Sports/Yoga) between 3rd to 6th semesters. However the option is given to students to change the activity. He / She may opt for the change of the course in ensuing semester. If the student is opting new course in 5th semester first time, he / she may take the basic modules (lower semester) from the syllabus to complete and if they repeat the same course in ensuing semester, subsequent modules can be offered.
- (5) Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree.
- (6) 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.
- (7) 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.

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Department of Electronics and Communication 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	PCC/BSC	B24EC41	FPGA System Design Using Verilog	ECE	ECE	2:2:0:0	32	03	50:50	100	3
2	IPCC	B24EC42	Principles of Communication Systems	ECE	ECE	3:0:2:0	48	03	50:50	100	4
3	IPCC	B24EC43	Signals and Systems	ECE	ECE	3:0:2:0	48	03	50:50	100	4
4	PCC	B24EC44	Microcontroller	ECE	ECE	3:0:0:0	48	03	50:50	100	3
5	ESC	B24EC45x	ESC / ETC /PLC	ECE	ECE	3:0:0:0	48	03	50:50	100	3
6	BSC	B24BOE46	Biology for Engineers	Any Dept.	CI	1:0:0:0	16	01	50:50	100	1
7	AEC / SEC	B24EC47x	Ability Enhancement Course / Skill Enhancement Course	ECE	ECE	If Theory 1:0:0:0	16	01	50:50	100	1
						If Lab 0:0:2:0	00	03			
8	UHV	B24UHK48	Universal Human Values	Any Dept.	IS	1:0:0:0	16	-	100:0	100	1
9	PCCL	B24ECL49	FPGA System Design Using Verilog Laboratory	ECE	ECE	0:0:2:0	00	03	50:50	100	1
10	NCMC	B24NSK410	National Service Scheme (NSS)-II	NSS Coordinator		0:0:0:0	00	-	100:0	100	0
		B24PEK410	Physical Education (PE) (Sports and Athletic)-II	PE Director							
		B24YOK410	Yoga-II	Yoga Teacher							
11	Audit	B24SDC411	Ready to Rise	T&P		0:0:0:2		-	100:0	100	0
TOTAL									700:400	1100	21

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Engineering Science Courses (ESC/ETC/PLC)

B24EC451	Data structures	B24EC453	Engineering Electromagnetics
B24EC452	Control Systems	B24EC454	Introduction to AI

Ability Enhancement Courses

B24EC471	Programmable Logic Controllers	B24EC473	Data structures Lab
B24EC472	Microcontroller Laboratory	B24EC474	Digital Switching Systems

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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			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 - 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 Probability distribution

Course Code	B24MAT31D	Total contact hours / week	3	CIE MARKS	50
Course Category	PCC/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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

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

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. (RBT Levels: L1, L2 and L3)	09
2	Infinite Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Inverse Fourier cosine and sine transforms. Problems.(RBT Levels: L1, L2 and L3)	09
3	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. (RBT Levels: L1, L2 and L3)	08
4	Probability Distributions: Review of basic probability theory, Random variables-discrete and continuous probability distribution function, cumulative distribution function, mean and variance, Binomial, Poisson, Exponential (with proofs for mean and standard deviation) and Normal distribution (without proof for mean and standard deviation). (RBT Levels: L1, L2 and L3)	08
5	Joint probability distribution and Stochastic Process: Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, standard deviation, covariance and correlation. Stochastic Process: Introduction to stochastic process, Probability Vectors, Transition probability matrices, Higher transition probabilities, regular stochastic matrices, Markov chains, Stationary distribution of Regular Markov chains and absorbing states.	08

PRESCRIBED TEXT BOOKS

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

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Higher Engineering Mathematics	V.Ramana	11 th Edition	McGraw-Hill Education	2017
2	Engineering Mathematics	Srimanta Pal & Subodh C. Bhunia	3 rd Edition	Oxford University Press	2016
3	A Text book of Engineering Mathematics	N.P Bali and Manish Goyal	10 th Edition	Laxmi Publications	2022
4	Advanced Engineering Mathematics	C.RayWylie , Louis C.Barret	6 th Edition	McGraw–HillBookCo.,NewYork	2017
5	Engineering Mathematic for Semester I and II	Gupta C.B,Sing S.R and Mukesh Kumar	1 st Edition	Mc-GrawHill Education Pvt. Ltd	2017

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
4	VTU e-Shikshana Program	https://www.youtube.com/c/VTUeShikshanaProgramme/playlists
5	VTU EDUSAT Program	https://elearning.vtu.ac.in/esk6.php

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
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
CO3	To solve Laplace's equation, heat equation and wave equations.
CO4	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering
CO5	To solve problems on joint probability distributions and stochastic process.

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, 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 assign 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).

Analog Electronic Circuits (Integrated)

Course Code	B24EC32	Total contact hours / week	5	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	4			Exam Duration	03

COURSE LEARNING OBJECTIVES

1. Physical structure and operation of MOSFETs, and their characteristics under various biasing conditions.
2. Modelling and small-signal behavior of MOSFET amplifiers using equivalent circuit techniques.
3. Basic analog signal processing circuits using Op-Amp for amplification, rectification and waveform generation.
4. Active filters, digital-to-analog and analog-to-digital converters.
5. Functionality of timing circuits (555 Timer) and Phase-Locked Loops (PLL) in various analog signal processing applications.

PREREQUISITES

Basics Electronics

MODULE #	TOPICS	Hours
1	MOSFETs: Introduction, Device structure, and physical operation - Device structure, operation with no gate voltage, creating a channel for current flow, applying a small VDs, Operation as VDs is increased, Channel Pinch-off and current Saturation. MOSFET Circuits at DC Biasing in MOS amplifier circuits: Biasing by fixing VGS, biasing by fixing VG, and connecting a resistor in the source, Biasing using a drain-to-gate feedback resistor. (Textbook 1: 5.1-5.1.5, 5.1.6, 5.3 & 6.4.1)	08
2	Small-signal operation and models of MOSFETs: The DC bias point, the signal current in the drain terminal, the voltage gain, separating DC analysis and the signal analysis, small signal equivalent circuit models, the transconductance (gm), T equivalent circuit model. (Textbook 1: 6.2.1). Single stage MOS amplifiers: The basic structure, characterizing amplifiers, The CS amplifier, The CS amplifier with a source resistance. Common gate (CG) Amplifier, The common Drain or source follower Amplifier. (Textbook 1:6.2, 6.3(Only MOSFET))	10
3	Operational Amplifier Applications: Instrumentation amplifier, Positive and Negative Clippers, Small Signal Half wave rectifiers, Positive and Negative Clamper, Absolute Value Output circuit, Sample and Hold circuit. (Textbook 2:6.6, 8.12, 8.14, 8.15, 3.1, 3.2, 3.3 & 3.4) Comparators and Waveform Generators: Comparator- Non-inverting and inverting, Zero Crossing detector, Schmitt Trigger. (Textbook 2: 8.1, 8.2, 8.3, 8.4, 7.11 to 7.13)	08

SEMESTER 3 SYLLABUS (Academic Year: 2025-2026)

4	<p>Active Filters: Introduction, RC Active Filters- First order and Second order low pass filters; High pass Filter, Band-pass Filter, Band Rejection Filter, All Pass Filter. (Textbook 2: 7.1 to 7.10)</p> <p>D-A and A-D Converters: Basic DAC Techniques- Weighted Resistor DAC, R-2R Ladder DAC, A-D converters, Successive Approximation Converter and DAC/ADC Specifications. (Textbook 2: 8.11.1 (a and b) & 8.11.2 a)</p>	08
5	<p>555 Timer: Introduction, Functional Diagram, Monostable and Astable Operation, Applications of Astable and Monostable Multivibrators. (Textbook 2: 9.1 to 9.4)</p> <p>Phase-Locked Loops: Introduction, Basic Principles, Phase Detector/Comparator, Voltage Controlled oscillator (VCO).</p> <p>Basic principles of oscillators: RC phase shift oscillators and Wien Bridge Oscillator. (Textbook 2: 9.5.1(a and c))</p>	08

Practical Component of IPCC (30 Hrs)

List of Experiments -using Discrete Components/simulation tools

1	Conduct an experiment to draw the Drain and Transfer characteristics of MOSFET.
2	Design and plot the frequency response of CS MOSFET amplifier.
3	Design and conduct an experiment for Adder, Integrator and Differentiator Circuits using Op-Amp.
4	Design and conduct an experiment for Sample and Hold circuit using Op-Amp.
5	Design and conduct an experiment for Second order active Low-Pass Filter (LPF) for a given cut-off frequencies.
6	Design and conduct an experiment for Second order active High-Pass Filter (HPF) for a given cut-off frequencies.
7	Design and conduct an experiment for RC phase shift oscillator using Op-Amp.
8	Design and conduct an experiment for wien's bridge oscillator using Op-Amp.
9	Design and conduct an experiment for 4-bit R - 2R Op-Amp Digital to Analog Converter for a 4-bit binary input using toggle switches.
10	Design and conduct an experiment for Monostable multivibrator using 555 timer.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Microelectronic Circuits Theory and applications	Adel S Sedra ,Kenneth C Smith	7 th Edition	Oxford higher education	2019
2	Op-Amps and Linear Integrated Circuits	Ramakant A Gayakwad	4 th Edition	PHI Learning Pvt Ltd.	2010

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Integrated Electronics	J. Millman and C. C. Halkias	2 nd Edition	Tata Mc-Graw Hill	2017
2	Fundamentals of Microelectronics	Behzad Razavi	6 th Edition	John Wiley	2013
3	Linear Integrated Circuits	D Roy Choudhury and Shail B Jain	5 th Edition	New age International Ltd.	2015

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

Sl. #	Type of E-Resource	URL
1	Online	<ul style="list-style-type: none"> • http://www.springer.com/engineering/electronics/book/978-0-387-25746-4, Analog Circuit Design: A Tutorial Guide to Applications and solutions. • https://www.tutorialspoint.com/linear integrated circuits applications/index.htm • https://www.scribd.com/book/282535091/Linear-Integrated- Circuits
2	MOOCs:	<ul style="list-style-type: none"> • https://nptel.ac.in/courses/108/106/108106084/ • https://nptel.ac.in/courses/108/102/108102095/ • https://nptel.ac.in/courses/117/103/117103063/ • https://www.khanacademy.org/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the structure and working of MOSFETs and analyze the DC biasing circuits.
CO2	Analyze and design small-signal amplifiers using MOSFETs.
CO3	Implement operational amplifier-based analog circuits and waveform generators.
CO4	Design active filters and evaluate DAC/ADC performance parameters.
CO5	Demonstrate the functionality and application of 555 timer and phase-locked loop.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	-	-	-	-	1	3	2	-
CO2	3	3	3	2	2	-	-	-	-	-	1	3	3	-
CO3	3	2	3	2	3	1	-	-	-	-	2	3	2	-
CO4	3	3	2	2	3	-	-	-	-	-	2	3	2	-
CO5	3	2	2	1	2	-	-	-	-	-	1	2	2	-
AVG	3	2.4	2.4	1.6	2.4	1	-	-	-	-	1.4	2.8	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. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Digital System Design using Verilog (Integrated)

Course Code	B24EC33	Total contact hours / week	5	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	4			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Concepts of simplifying Boolean expression using K-map techniques and Quine Mc Cluskey minimization techniques.
2. Adders, Subtractors, Encoders, Decoders, Multiplexers and Comparators.
3. Methods and analysis of sequential logic circuits.
4. Concepts of Verilog HDL-data flow and behavioural models for the design of digital systems.

PREREQUISITES

Basics Electronics

MODULE #	TOPICS	Hours
1	Principles of Combinational Logic: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps-up to 4 variables, Quine-McCluskey Minimization Technique, Quine-McCluskey using Don't Care Terms. (Textbook 1:3.1, 3.2, 3.3, 3.4 & 3.5)	08
2	Logic Design with MSI Components: Binary Adders and Subtractors, Decimal Adders, Comparators, Decoders, Encoders, and Multiplexers, Programmable Logic Devices(PLDs). (Textbook 2: 5.1.1, 5.1.2, 5.2, 5.3, 5.4, 5.5, 5.6 & 5.7)	08
3	Flip-Flops and their Applications: The Master-Slave Flip-flops (Pulse-Triggered flip-flops): SR flip-flops, JK flip-flops, Characteristic equations, Registers, Binary Ripple Counters, Synchronous Binary Counters, Counters based on Shift Registers, Design of Synchronous mod-n Counter using clocked T, J K, D and SR flip-flops. (Textbook 2: 6.4 & 6.6 to 6.9 (Excluding 6.9.3))	10
4	Introduction to Verilog: Structure of Verilog module, Operators, Data Types, Styles of Description. (Textbook 3: 1.1to1.6.2, 1.6.4 (only Verilog)) Verilog Data flow description: Highlights of Data flow description, Structure of Data flow description.(Textbook 3: 2.1to2.2(only Verilog))	08
5	Verilog Behavioral description: Structure, Variable Assignment Statement, Sequential Statements, Loop Statements, Verilog Behavioral Description of Multiplexers (2:1, 4:1, 8:1). (Textbook 3: 3.1 to 3.4 (only Verilog)) Verilog Structural description: Highlights of Structural description, Organization of structural description, Structural description of ripple carry adder.(Textbook 3: 4.1 to 4.2)	08

Practical Component of IPCC (30 Hrs)

List of Experiments -use Hardware components

1	Realization of Boolean Expressions using logic gates.
2	Realization of Binary Adder and Subtractor using Universal Gates.
3	Implementation of Boolean functions using IC 74153 and IC 74139.
4	Conversion of Binary to Gray Code and Vice-Versa using Ex-OR gates.
5	Design a 2-bit Magnitude Comparator using logic gates and a 4-bit comparator using IC 7485.
6	Verification of truth tables of Master-Slave JK, T, and D flip-flops using NAND gates.
7	Verify the following operations using IC 7495. i) SISO (ii)SIPO (iii) PISO (iv) PIPO
8	Realization of Binary Adder and Subtractor using IC 7483.
9	Verify the truth table of Master-Slave JK, T, and D flip-flops using NAND gates.
10	Realization of Asynchronous Mod -N counter using IC, 7490, IC 74193.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Digital Logic Applications and Design	John M Yarbrough	1 st Edition	Thomson Learning	2006
2	Digital Principles, and Design	Donald D. Givone	5 th Edition	Tata McGraw Hill Education	2002
3	HDL Programming VHDL and Verilog	Nazeih M Botros,	Reprint	Dream techpress.	2009

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of Logic Design	Charles H Roth Jr	7 th Edition	Cengage Learning	2014
2	Logic Design	Sudhakar Samuel	Pearson 2008 Copyright Edition	Pearson/Sanguine	2010
3	Fundamentals of HDL	Cyril PR		Pearson/Sanguine	2010

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

Sl. #	Type of E-Resource	URL
1	MOOCs:	<ul style="list-style-type: none"> • https://nptel.ac.in/courses/108105113/ • https://nptel.ac.in/courses/106105185/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Simplify Boolean functions using K-map and Quine-McCluskey minimization technique.
CO2	Analyze and design for combinational logic circuits
CO3	Analyze the concepts of Flip Flops(SR, D,T and JK) and to design the synchronous sequential circuits using Flip Flops.
CO4	Model Combinational circuits (adders, subtractors, multiplexers) and sequential circuits using Verilog descriptions.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	-	-	-	-	-	-	-	-	1	-	3	-
CO2	2	2	1	-	-	-	-	-	-	-	1	-	3	-
CO3	2	2	1	-	-	-	-	-	-	-	1	-	3	-
CO4	2	2	2	-	2	-	-	-	-	-	1	-	3	-
AVG	2	2	1.3	-	2	-	-	-	-	-	1	-	3	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Encourage collaborative (Group) Learning in the class.
3. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
5. Topics will be introduced in a multiple representation.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

Network Analysis

Course Code	B24EC34	Total contact hours / week	4	CIE MARKS	50
Course Category	PCC	Total SAAE hours/ semester	32	SEE MARKS	50
L:T:P:S	2:2:0:0	Total Notional Learning Hours	90	TOTAL MARKS	100
Total credits	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Mesh and Nodal techniques to solve electrical networks.
2. Concept of Network theorems to solve electrical networks.
3. Network parameters for two port networks.
4. Transient behavior of electrical circuit during switching.

PREREQUISITES

Elements of Electrical Engineering

MODULE #	TOPICS	Hours
1	Basic circuit analysis concepts: Practical Sources, Source transformation, Star-Delta Conversion, Mesh analysis and Node analysis with dependent and independent sources for DC and AC networks. Concepts of super node and super mesh.	10
2	Network Theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem and Millman's theorem.	8
3	Two port Network Parameters: Definition of Z, Y, h and Transmission parameters, Modeling with these parameters and relationship between parameters.	8
4	Transient behaviour and initial conditions: Behaviour of circuit elements under switching condition and their representation of initial and final conditions in RL, RC and RLC circuits for DC excitations, Application of Laplace for RLC Circuits.	8
5	Graph Theory and Network equations: Graph of a network, Trees, Co-trees and Loops, Incidence Matrix, Cut-set Matrix, Tie-set Matrix and loop currents, Number of possible trees of a graph and Duality.	8

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Circuit Theory and Networks, Analysis and Synthesis	Ravish R. Singh	2 nd Edition	McGraw-Hill Education (India) Pvt Ltd.	2019

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Schaum's Outline of Electric Circuits	Mahmood Nahvi & Joseph A. Edminister	6 th Edition	McGraw-Hill Education	2014
2	Engineering Circuit Analysis	William H.Hayt, Jack Kemmerly & Steven M. Durbin	8 th Edition	Tata McGraw-Hill Education	2013
3	Networks and Systems	D. Roy Choudhury	2 nd Edition	New Age International Pvt Ltd	2010
4	Network Analysis	VanValkenburg M. E.	3 rd Edition	Prentice Hall of India Pvt Ltd	2002

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

Sl. #	Type of E-Resource	URL
1	MOOC's	<ul style="list-style-type: none"> • https://archive.nptel.ac.in/courses/108/105/108105159/ • https://onlinecourses.nptel.ac.in/noc20_ee46/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Determine the current and/or voltage by simplifying an electrical network using mesh and node analysis.
CO2	Solve the electrical networks by applying theorems to reduce circuit complexities.
CO3	Determine Z, Y, h and T parameters and their inter relationship for a given two port networks.
CO4	Analyze the initial behaviour of the electrical circuit and find the network solution using Laplace transform.
CO5	Estimate the current and/or voltage for the given electrical networks using Graph theory.

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	2	-	-
CO2	2	3	2	1	-	-	-	-	-	-	1	2	-	-
CO3	3	3	2	1	-	-	-	-	-	-	1	2	-	-
CO4	3	3	2	1	-	-	-	-	-	-	1	2	-	-
CO5	3	3	2	1	-	-	-	-	-	-	1	2	-	-
AVG	2.8	3	1.8	1	-	-	-	-	-	-	1	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. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.

Programming in C++

Course Code	B24EC351	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Features of object-oriented programming.
2. Data abstraction and encapsulation.
3. Constructors, destructors and operator overloading.
4. Inheritance and virtual functions.

PREREQUISITES

Basics of C programming

MODULE #	TOPICS	Hours
1	Beginning with C++ and its features: What is C++? Applications and structure of C++ program, Different Data types, variables, Different Operators, expressions, operator overloading and control structures in C++. (Textbook: Chapter 2: 2.1-2.3,2.6, Chapter 3: 3.1-3.6, 3.8-3.15,3.19-3.25)	08
2	Functions, classes and Objects: Functions, Inline function, function overloading, friend and virtual functions, specifying a class, C++ program with a class, arrays within a class, memory allocation to objects, array of objects, members, pointers to members and member functions. (Textbook : Chapter 4: 4.1 - 4.6, 4.10, 4.11, Chapter 5: 5.3- 5.5, 5.9, 5.10, 5.13-5.15, 5.18)	10
3	Constructors and Destructors: Constructors, parameterized constructors, Multiple constructors in a class, Copy constructor, Dynamic constructor, Destructors. (Textbook: Chapter 6: 6.1-6.5,6.7,6.8, 6.11)	08
4	Operator overloading: Defining operator overloading, Overloading Unary and binary operators, Overloading Binary Operators Using Friends, rules for overloading operators. (Textbook: Chapter 7: 7.1 - 7.5,7.8)	08
5	Inheritance and Polymorphism: Derived Classes, Single, multilevel, multiple inheritance, Pointers to objects and derived classes, this pointer, Virtual and pure virtual functions. (Textbook: Chapter 8: 8.1-8.6, Chapter 9: 9.3 -9.8)	08

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Object Oriented Programming with C++	E. Balaguruswamy	7 th Edition	Tata McGraw Hill	2018

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Object Oriented Programming using C++	Robert Lafore	4 th Edition	Galgotia publication	2010
2	C++ The Complete Reference	Herbert Schildt	4 th Edition	McGraw Hill Education	2017

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

Sl. #	Type of E-Resource	URL
1	online	<ul style="list-style-type: none"> • https://www.w3schools.com/cpp/cpp_oop.asp 2. • https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/
2	MOOC's	<ul style="list-style-type: none"> • https://www.mooc-list.com/course/object-oriented-programming-edx

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Describe the basic concepts of object-oriented programming language.
CO2	Implement classes and objects using functions.
CO3	Explain constructors and destructors and develop programs to overload operators.
CO4	Develop programs by using inheritance and polymorphism.

CO-PO-PSO Mapping

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

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Encourage collaborative (Group) Learning in the class.
3. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize and analyze information rather than simply recall it.
5. Topics will be introduced in a multiple representation.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the that topic in the succeeding classes.
9. Give Programming Assignments.

Sensors and Instrumentation

Course Code	B24EC352	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES- Students are able to learn

1. Concepts of Sensors, its classification and Materials.
2. Resistive Sensors and Digital and Intelligent Sensors.
3. Concepts of Measurement and Working of Digital Voltmeter and Instruments.
4. Measurement of various parameters using Bridges.
5. Operations of Oscilloscopes, Signal Generators and Wave Analyzers.

PREREQUISITES

Basic Electronics, Basic Electrical Engineering.

MODULE #	TOPICS	Hours
1	Introduction to sensor-based measurement systems: General concepts and terminology, Sensor classification, Primary Sensors-Temperature sensors, Pressure Sensors, Level sensors, Materials for Sensors, Micro sensor Technology. (Textbook 1: 1.1, 1.2, 1.7, 1.8 & 1.9)	08
2	Resistive Sensors -Potentiometer, Strain Gauge, Resistive Temperature detector, Thermistors. Digital and Intelligent Sensors: Resonant Sensors- Sensor based on Quartz resonators, Digital Quartz Thermometer, Frequency Measurement, Period and Time Interval Measurement. (Textbook 1: 2.1, 2.2.1, 2.3 & 2.4.1, 8.2.1, 8.2.1.1, 8.5.1 & 8.5.2)	08
3	Principles of Measurement: Static Characteristics, Error in Measurement, Types of Static Error, Source of Error. Digital Voltmeter: Introduction, Ramp Technique, Dual slope, integrating Type DVM, and Successive Approximations type DVM. Digital Instruments: Digital tachometer, Digital pH meter, Digital phase meter. (Textbook 2: 1.3, 1.4, 1.5, 1.6, 5.1, 5.2, 5.3, 5.4, 5.6, 6.9, 6.10 & 6.12)	08
4	Bridges: Wheatstone's Bridge, Kelvin's Bridge, AC Bridges – Capacitance Comparison bridge, Inductance Comparison bridge, Maxwell's Bridge, Wien's bridge. (Textbook 2: 11.2, 11.2.1, 11.2.2, 11.2.3, 11.2.4, 11.2.5, 11.3, 11.8, 11.9, 11.10, 11.11 & 11.14)	08
5	Oscilloscopes: Introduction, Basic Principle, CRT Features, Block diagram of oscilloscope, Dual beam CRO, Dual Trace oscilloscope, Storage oscilloscope, Signal Generators: Standard Signal Generator, Function Generator, Random Noise Generator. Wave Analyzers: Basic wave analyzer, heterodyne wave analyzer, Spectrum Analyzer. (Textbook 2: 7.1, 7.2, 7.3, 7.4, 7.14, 7.15, 7.18, 8.5, 8.8, 8.10, 9.2, 9.4 & 9.6)	10

PRESCRIBED TEXT BOOKS

Textbook #	Book Title	Authors	Edition	Publisher	Year
1	Sensors and Signal Conditioning	Ramon Pallas Areny, John G. Webster	2 nd Edition	John Wiley and Sons	2000
2	Electronic Instrumentation	H S Kalsi	3 rd Edition	Mc Graw Hill	2012

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Electronic Instrumentation & Measurements	David Bell	2 nd Edition	Oxford University Press PHI	2006
2	Modern Electronic Instrumentation and Measuring Techniques	D. Helfrick and W.D. Cooper	1 st Edition	Pearson	2015

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://onlinecourses.nptel.ac.in/noc21_ee32/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the concept of Sensors and operation of primary sensors.
CO2	Describe the operation of various Resistive, Digital and Intelligent Sensors.
CO3	Explain the operation of measurements and the operation of Digital voltmeter and Instruments.
CO4	Evaluate various measurement parameters using various bridges.
CO5	Elaborate the working of Oscilloscopes, Signal Generators and Wave Analyzers.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	1	1	1	-	-	-	-	-	-	-	-	2	1	-
CO3	1	2	-	-	-	-	-	-	-	-	1	2	-	-
CO4	3	3	2	-	-	-	1	-	-	-	1	2	1	-
CO5	2	1	-	-	-	-	1	-	-	-	1	2	1	-
AVG	1.8	1.6	1.5	-	-	-	1	-	-	-	1	2	1	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.

Computer Organization and Architecture

Course Code	B24EC353	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Basic sub systems of a computer, their organization, structure and operation.
2. Illustrate the concept of programs as sequences of machine instructions.
3. Different ways of communicating with I/O devices.
4. Memory hierarchy and concept of virtual memory.
5. Simple pipelined processor and other computing systems.

PREREQUISITES

Basic Electronics

MODULE #	TOPICS	Hours
1	Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance -Processor Clock, Basic Performance Equation. (Text book: Chapter 1-upto1.6.2) Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, IEEE standard for Floating Point Numbers, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing. (Text book: Chapter 2-upto 2.4.6, Chapter 6-6.7.1)	08
2	Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions. (Text book: Chapter 2- 2.4.7, 2.11 & 2.12, except 2.9.3)	08
3	Input/ Output Organization: Accessing I/O Devices, Interrupts -Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Direct Memory Access. (Text book: Chapter 4- Upto 4.2.4 and 4.4 except 4.4.1)	08
4	Memory System: Basic Concepts, Semiconductor RAM Memories-Internal organization of memory chips, Static memories, Asynchronous DRAMS, Read Only Memories, Cash Memories, Virtual Memories, Secondary Storage Magnetic Hard Disks. (Text book: Chapter 5- 5.1, 5.2, 5.2.1, 5.2.2, 5.2.3, 5.3, 5.5 (except 5.5.1 to 5.5.4), 5.7 (except 5.7.1), 5.9 & 5.9.1)	10
5	Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control, Microprogrammed Control. (Text book : Chapter 7- up to 7.5 except 7.5.1 to7.5.6)	08

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Computer Organization	Carl Hamacher, Zvonko Vranesic, Safwat Zaky	5 th Edition	Tata McGrawHill	2002

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Computer Organization and Design-The Hardware/ Software Interface ARM Edition	David A. Patterson & John L. Hennessy	4 th Edition	Elsevier	2009
2	Computer Organization & Architecture	William Stallings	7 th Edition	PHI	2006
3	Computer Systems Design and Architecture	Vincent P. Heuring & Harry F. Jordan	2 nd Edition	Pearson Education	2004

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://archive.nptel.ac.in/courses/106/105/106105163/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain the basic organization of a computer system.
CO2	Describe the addressing modes, instruction formats and program control statement.
CO3	Explain different ways of accessing an input/ output device including interrupts.
CO4	Illustrate the organization of different types of semiconductor and other secondary storage memories.
CO5	Illustrate simple processor organization based on hard wired control and micro-programmed control.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	1	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO4	3	1	2	-	-	-	-	-	-	-	1	-	1	-
CO5	3	2	1	-	-	-	-	-	-	-	1	-	1	-
AVG	2.8	1.6	1.75	-	-	-	-	-	-	-	1	-	1	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.

Industrial Electronics

Course Code	B24EC354	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Types of industrial power devices, their structure, and its characteristics.
2. Power electronic circuits.
3. MEMs devices, principle of operation and construction.
4. Familiarize with soft core processors and computer architecture.
5. Protective methods for devices and circuits.

PREREQUISITES

Basic Electronics

MODULE #	TOPICS	Hours
1	Industrial Power Devices: General purpose power diodes, fast recovery power diodes, schottky power diodes, silicon carbide power diodes. (Textbook 1: 2.5 & 2.6) Power MOSFETs, Steady state characteristics, switching characteristics, silicon carbide MOSFETs, COOLMOS, Junction field effect transistors, operation and characteristics of JFETs, Silicon Carbide JFET structures, Bipolar Junction Transistors, Steady state characteristics, switching characteristics, silicon carbide BJTs, IGBT, silicon carbide IGBTs (Textbook 1: 4.3, 4.4, 4.6 & 4.7)	08
2	Power Electronics Circuits: Thyristor, Thyristor characteristics, two transistor models. (Textbook 1: 9.2, 9.3 & 9.4). Controlled Rectifiers – Single phase full converter with R and RL load, Single phase dual converters, and three phase full converter with RL load. (Textbook 1: 10.2, 10.3 & 10.4). Switching mode regulators – Buck Regulator, Boost regulator, Buck – Boost regulator, comparison of regulators. (Textbook 1: 5.9.1, 5.9.2, 5.9.3 & 5.10)	10
3	Inverters – Principle of operation, Single phase bridge inverter, three phase inverter with 180 and 120 degrees conduction, Current source inverter. (Textbook 1: 6.3, 6.4, 6.5 & 6.9). AC voltage controllers – Single phase full wave controller with resistive load, single phase full wave controller with inductive load (Textbook 1: 11.3 & 11.4).	08
4	MEMS Devices: Sensing and Measuring Principles, Capacitive Sensing, Resistive Sensing, Piezoelectric Sensing, Thermal Transducers, Optical Sensors, Magnetic Sensors, MEMS Actuation Principles, Electrostatic Actuation, Thermal Actuation, Piezoelectric Actuation, Magnetic Actuation, MEMS Devices Inertial Sensors, Pressure Sensors, Radio Frequency MEMS:	08

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	Capacitive Switches and Phase Shifters, Microfluidic Components, Optical Devices. (Textbook 2: 13.1, 13.3 & 13.4) MEMS Applications: Introduction, Industrial, Automotive, Biomedical. (Textbook 2: 15.1, 15.2, 15.3 & 15.4)	
5	Protections of Devices and Circuits: Cooling and Heat sinks, Thermal Modeling of Power Switching Devices, Electrical Equivalent Thermal model, Mathematical Thermal Equivalent Circuit, Coupling of Electrical and Thermal Components, Snubber circuits, Voltage protection by Selenium Diodes and Metal oxide Varistors, Current protection, Fusing, Fault current with AC source, Fault current with DC source, Electromagnetic Interference, sources of EMI, Minimizing EMI Generation, EMI shielding, EMI standards. (Textbook 1: 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8 & 17.9)	08

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Power Electronics: Devices, Circuits, and Applications	Muhammad H. Rashid	4 th International Edition	Pearson	2014
2	Fundamentals of Industrial Electronics	Bogdan M. Wilamowski & J. David Irwin	1 st Edition	CRC Press	2011

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Industrial Electronics: Applications for Programmable Controllers Instrumentation and Process Control, and Electrical Machines and Motor Controls	Thomas E. Kissell	3 rd Edition	Prentice Hall	2003
2	Power Electronics: Converters, Applications and Design	Ned Mohan, T.M. Undeland and W.P. Robbins	3 rd Edition	Wiley India Ltd	2008

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

Sl. #	Type of E-Resource	URL
1	Weblink's	<ul style="list-style-type: none"> • https://archive.nptel.ac.in/courses/108/102/108102145/ • https://nptel.ac.in/courses/117105082 • https://www.youtube.com/channel/UCKg8GNii0Q-ieXE56AXosGg/featured • https://www.ieee-ies.org/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain different types of industrial power devices such as MOSFET, BJT, IGBT etc, their structure, and its operating characteristics.
CO2	Analyze the Controlled Rectifiers and regulators.
CO3	Explain the working principles of Inverters and AC voltage regulators.
CO4	Familiarization of MEM'S and its applications.
CO5	Apply protective methods for various industrial power devices.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	3	2	2	-	-	-	-	-	-	-	-	3	2	-
CO3	2	1	2	-	-	-	-	-	-	-	-	2	1	-
CO4	3	2	2	1	1	-	-	-	-	-	1	3	2	-
CO5	2	2	2	1	1	-	-	-	-	-	1	2	2	-
AVG	2.2	1.6	2	1	1	-	-	-	-	-	1	2.2	1.6	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.

SOCIAL CONNECT AND RESPONSIBILITY

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

COURSE LEARNING OBJECTIVES

- 1) Provide a formal platform for students to communicate and connect to the surroundings.
- 2) Create a responsible connection with 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.	06
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.	06
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.	06
4	Water conservation: Knowing the present practices in the surrounding	06

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	villages and implementation in the campus, documentary or photoblog presenting the current practices – Objectives, Visit, case study, report, outcomes.	
5	Food walk: City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes.	06

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	-	-	-	-	-	3	3	3	3	3	3	-	-	-
C02	-	-	-	-	-	3	3	3	3	3	3	-	-	-
C03	-	-	-	-	-	3	3	3	3	3	3	-	-	-
C04	-	-	-	-	-	3	3	3	3	3	3	-	-	-
C05	-	-	-	-	-	3	3	3	3	3	3	-	-	-
C06	-	-	-	-	-	3	3	3	3	3	3	-	-	-
AVG	-	-	-	-	-	3	3	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) 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.

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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 implementation in the campus.	03 - 05 More than one group can be assigned	Preferably in the nearby villages and within the campus.	One	Report on importance and benefits of Waste management. Report on segregation, collection, transportation and disposal.	

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			one task based on magnitude of task.			Suggestion for composting. Visit nearby village/location to sensitize farmers and public about waste management and also document current practises.
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 grains, and plants.

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.
	<ul style="list-style-type: none"> • 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.

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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 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.
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study based Assessment Individual performance with report	20 Marks	
Sector wise study & its consolidation 5*5 = 25	25 Marks	
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.

Programming in C++ Laboratory

Course Code	B24EC371	Total contact hours / week	2	CIE MARKS	50
Course Category	AEC	Total SAAE hours/ semester	-	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	1			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Object-oriented programming concepts, and apply them in solving problems.
2. To create, debug and run simple C++ programs.
3. Concepts of functions, friend functions, inheritance, polymorphism and function overloading.
4. Concepts of exception handling and multithreading.

PREREQUISITES

Fundamental of Computing and Programming in C.

Sl.#	Experiments
1	Write a C++ program to find largest, smallest & second largest of three numbers using inline functions MAX & Min.
2	Write a C++ program to calculate the volume of different geometric shapes like cube, cylinder and sphere using function overloading concept.
3	Define a STUDENT class with USN, Name & Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the USN, Name & the average marks of all the students.
4	Write a C++ program to create class called MATRIX using two-dimensional array of integers, by overloading the operator == which checks the compatibility of two matrices to be added and subtracted. Perform the addition and subtraction by overloading + and - operators respectively. Display the results by overloading the operator <<. If (m1 == m2) then m3 = m1 + m2 and m4 = m1 - m2 else display error.
5	Demonstrate simple inheritance concepts by creating a base class FATHER with data members: First Name, Surname, DOB & bank Balance and creating a derived class SON, which inherits: Surname & Bank Balance feature from base class but provides its own feature: First Name & DOB. Create & initialize F1 & S1 objects with appropriate constructors & display the FATHER & SON details.
6	Write a C++ program to define class name FATHER & SON that holds the income respectively. Calculate & display total income of a family using Friend function.
7	Write a C++ program to accept the student details such as name & 3 different marks by get_data() method & display the name & average of marks using display() method. Define a friend function for calculating the average marks using the method mark_avg().
8	Write a C++ program to explain virtual function (Polymorphism) by creating a base class polygon which has virtual function areas two classes rectangle & triangle derived from polygon & they have area to calculate & return the area of rectangle & triangle respectively.
9	Design, develop and execute a program in C++ based on the following requirements: An EMPLOYEE class containing data members & member's functions: i) Data members: employee number (an integer), Employee_Name (a string of characters), Basic_Salary (in integer), All_

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	Allowances (an integer), Net Salary (an integer). (ii) Member functions: To read the data of an employee, to calculate Net Salary & to print the values of all the data members. (All_Allowances = 123% of Basic, Income Tax (IT) =30% of gross salary (=basic_Salary_All_Allowances_IT).
10	Write a C++ program to create three objects for a class named count object with data members such as roll_no & Name. Create a member's function set_data () for setting the data values & display () member function to display which object has invoked it using „this“ pointer.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Object Oriented Programming with C++	E. Balaguruswamy	7 th Edition	Tata McGraw Hill	2018

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Object Oriented Programming using C++	Robert Lafore	4 th Edition	Galgotia publication	2010
2	C++ The Complete Reference	Herbert Schildt	4 th Edition	McGraw Hill Education	2017

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://onlinecourses.nptel.ac.in/noc22_cs103/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Write programs related to the concept of functions.
CO2	Write programs using operator overloading.
CO3	Write programs for Object Oriented concepts such as encapsulation, inheritance and polymorphism.

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	-
CO2	3	3	3	-	3	-	3	-	-	-	-	-	3	-
CO3	3	3	3	-	3	-	3	-	-	-	-	-	3	-
AVG	3	3	3	-	3	-	3	-	-	-	-	-	3	-

Introduction to MATLAB

Course Code	B24EC372	Total contact hours / week	1	CIE MARKS	50
Course Category	AEC	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	1			Exam Duration	1

COURSE LEARNING OBJECTIVES

1. MATLAB commands and functions.
2. Create and execute the script and function files.
3. Work with built in function, saving and loading data and creating plots.
4. Work with arrays, matrices, symbolic computations, files and directories.
5. MATLAB programming with script, functions and language specific features.

PREREQUISITES

Basics of linear algebra and calculus.

MODULE #	TOPICS	Hours
1	Introduction: Basics of MATLAB, Simple arithmetic calculations, Creating and working with arrays and numbers. Creating and printing simple plots, Creating, saving and executing a script file, Creating and executing a function file, Working with arrays and matrices.	06
2	Programming in MATLAB: Script Files, Function Files, Language specific Features. Working with anonymous functions, Symbolic Computations, Importing and exporting data, Working with files and directories.	04
3	Interactive computations: Matrices and vectors, Matrix and array operations, Character strings, Command line functions, Built-in functions, Saving and loading data, Plotting simple plots.	04

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers	R. Pratap	7 th Edition	Oxford University Press	2016
2	MATLAB 6 for Engineers	A. Biran and M. Breiner	2 nd Edition	Prentice-Hall	2002

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Mastering MATLAB	D. Hanselman & B. Littlefield	1 st Edition	Prentice-Hall	2011
2	MATLAB Programming for Engineers	S. J. Chapman,	5 th Edition	Cengage Learning	2015

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://onlinecourses.nptel.ac.in/noc20_ge05/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the syntax of MATLAB for arithmetic computations, arrays, matrices.
CO2	Understand the built in function, saving and loading data, and create plots.
CO3	Create program using symbolic computations, Importing and exporting data and files.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	1	-	2	-	-	1	-	-	1	2	-	-
CO2	2	2	1	-	2	-	-	1	-	-	1	2	-	-
CO3	2	2	1	-	2	-	-	1	-	-	1	2	-	-
AVG	2	2	1	-	2	-	-	1	-	-	1	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. Adopt Problem Based Learning (PBL), which fosters students' analytical skills, develop thinking skills such as the ability to evaluate, generalize and analyze information rather than simply recall it.
2. Give programming assignments.

IOT System Design

Course Code	B24EC373	Total contact hours / week	1	CIE MARKS	50
Course Category	AEC	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	1			Exam Duration	1

COURSE LEARNING OBJECTIVES

1. Physical and Logical Design of IOT, Levels and deployment templates of IOT.
2. Domain Specific of IOT's.
3. M2M, Design Methodologies and Data analytics for IOT.

PREREQUISITES

Internet Of Things(IOT)

MODULE #	TOPICS	Hours
1	Introduction to IoT Introduction, Physical design of IOT, Logical design of IOT, IOT enabling technologies, IOT Levels and deployment templates. Domain Specific IOT's: Introduction, Home automation, Cities, Environment and Energy. (Textbook: 1.1-1.5, 2.1-2.5)	06
2	IoT and M2M: Introduction, M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking and Network Function Visualaization. (Textbook:3.1-3.4)	04
3	Developing IOT: Introduction, IOT design methodologies, case study on IOT system for weather monitoring and Motivation for using python. Data analytics for IOT: Introduction, Apache Hadoop, Apache Oozie and Apache Storm. (Textbook: 5.1-5.4, 10.1, 10.2, 10.4 & 10.6)	04

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Internet of Things (A Hands-on-Approach)	Arshdeep Bahga & Vijay Madiseti	Illustrated, reprint	Universities Press	2014

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://onlinecourses.nptel.ac.in/noc21_cs17/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the Physical and Logical Design of IOT, Levels and deployment templates of IOT.
CO2	Describes the Characteristics and applications of domain specific of IOT.
CO3	Describes the difference and similarities between IOT and M2M.
CO4	Understand the approaches for collecting and analyzing the data generated by IOT system.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	1	2	-
CO2	-	2	-	-	-	-	-	-	-	-	-	1	2	-
CO3	-	2	-	-	-	-	-	-	-	-	-	1	2	-
CO4	2	2	-	-	2	-	-	-	-	-	1	1	2	-
AVG	2	2	-	-	2	-	-	-	-	-	1	1	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. Interactive Lectures:** Conduct interactive lectures to present the theoretical concepts and foundational knowledge of IoT for smart infrastructure.
- 2. Case Studies and Group Discussions:** Utilize case studies to analyse real-world implementations of IoT in smart infrastructure projects. Divide students into groups and assign them specific cases to discuss and analyse.
- 3. Hands-on Workshops and Simulations:** Organize hands-on workshops or simulations where students can interact with IoT devices and technologies relevant to smart infrastructure.
- 4. Guest Lectures and Industry Experts:** Invite guest speakers or industry experts who have hands-on experience in implementing IoT in smart infrastructure projects. They can share their insights, challenges, and success stories, providing students with a real-world perspective.
- 5. Project-Based Learning:** Assign students to work on individual or group projects related to IoT for smart infrastructure. Provide a project brief with specific objectives and deliverables. Students can apply their knowledge and skills to design, develop, or analyse IoT solutions for smart infrastructure challenges.

LABVIEW programming

Course Code	B24EC374	Total contact hours / week	2	CIE MARKS	50
Course Category	AEC	Total SAAE hours/ semester	-	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	1			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Front panel controls and indicators.
2. Connect and manipulate nodes and wires in the block diagram.
3. Toolbars and pull-down menus for the purpose of implementing specific functions.
4. Locate and utilize the context help window.
5. LABVIEW and its different applications.
6. Virtual Instrument (VI).

PREREQUISITES

Programming languages such as C and Python.

Sl.No	VI Programs (using LabVIEW software) to realize the following:
1	Basic arithmetic operations: addition, subtraction, multiplication and division.
2	Boolean operations: AND, OR, XOR, NOT and NAND.
3	Sum of 'n' numbers using 'for' loop.
4	Factorial of a given number using 'for' loop.
5	Determine square of a given number.
6	Factorial of a given number using 'while' loop.
7	Sorting even numbers using 'while' loop in an array.
8	Finding the array maximum and array minimum.
Demonstration Experiments (For CIE)	
9	Build a Virtual Instrument that simulates a heating and cooling system. The system must be able to be controlled manually or automatically.
10	Build a Virtual Instrument that simulates a Basic Calculator (using formula node).
11	Build a Virtual Instrument that simulates a Water Level Detector.
12	Demonstrate how to create a basic VI which calculates the area and perimeter of a circle.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Virtual Instrumentation using LABVIEW	Jovitha Jerome	Illustrated, reprint	PHI	2011
2	Virtual Instrumentation using LABVIEW.	Sanjay Gupta, Joseph John	2 nd Edition	TMH, McGraw Hill	2011

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

Sl. #	Type of E-Resource	URL
1	Weblink	https://learn.ni.com/learn/article/labview-tutorial

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Use LABVIEW to create data acquisition, analysis and display operations.
CO2	Create user interfaces with charts, graph and buttons.
CO3	Use the programming structures and data types that exist in LABVIEW.
CO4	Use various editing and debugging techniques.

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
CO1	3	2	2	-	2	-	-	-	1	-	1	1	1	-
CO2	3	2	2	-	2	-	-	-	1	-	1	1	1	-
CO3	2	2	2	-	2	-	-	-	1	-	1	1	1	-
CO4	2	2	2	-	2	-	-	-	1	-	1	1	1	-
AVG	2.5	2	2	-	2	-	-	-	1	-	1	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. Adopt Problem Based Learning (PBL), which fosters students' analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
2. Give programming assignments.

Verilog HDL Laboratory

Course Code	B24ECL38	Total contact hours / week	2	CIE MARKS	50
Course Category	PCCL	Total SAAE hours/ semester	-	SEE MARKS	50
L: T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	1			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Familiarize with the CAD tool to write HDL programs.
2. Simulation and synthesis of digital design.
3. Program FPGAs to synthesize the digital designs.
4. Interface hardware to programmable ICs through I/O ports.

PREREQUISITES

Basic Electronics

Sl.#	Experiments (All the experiments has to be conducted using circuit simulation software)
1	To simplify the given Boolean expressions and realize using Verilog program.
2	To realize Adder/Subtractor(Full/half)circuits using all the three modelling styles.
3	To realize 4-bit ALU using Verilog program.
4	To realize the following Code converters using Verilog Behavioral description a)Gray to binary and vice versa b)Binary to excess3 and vice versa
5	To realize using Verilog Behavioural description:8:1mux, 8:3encoder, Priority encoder.
6	To realize using Verilog Behavioural description:1:8Demux, 3:8 decoder,2 -bit Comparator
7	To realize using Verilog Behavioural description: Flip-flops: a)JK type b)SR type c)T type and d)D type.
8	To realize Counters-up/down (BCD and binary)using Verilog Behavioral description.
Demonstration Experiments (For CIE only-not to be included for SEE) Use FPGA/CPLD kits for down loading Verilog codes and check the output for interfacing experiments.	
9	Verilog Program to interface a Stepper motor to the FPGA/CPLD and rotate the motor in the specified direction (by N steps).
10	Verilog programs to interface Switches and LEDs to the FPGA/CPLD and demonstrate its working.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	HDL Programming VHDL and Verilog	Nazeih M Botros,	Reprint	Dream techpress.	2009
2	Verilog HDL: A Guide to Digital Design and Synthesis.	Samir Palnitkar	2 nd Edition	Pearson Education	2003

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of HDL	Cyril PR		Pearson/Sanguine	2010

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://onlinecourses.nptel.ac.in/noc24_ee73/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Write the Verilog programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.
CO2	Write the Verilog programs for sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.
CO3	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.
CO4	Interface the hardware to the 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	-	-	3	-	-	-	1	-	1	-	2	-
CO2	2	2	-	-	3	-	-	-	1	-	1	-	2	-
CO3	2	-	-	-	3	-	-	-	1	-	1	-	2	-
CO4	2	2	-	-	3	-	-	-	1	-	1	-	2	-
AVG	2	2	-	-	3	-	-	-	1	-	1	-	2	-

NATIONAL SERVICE SCHEME (NSS) – I

Course Code	B24NSKxxx	Total contact hours / week	2	CIE MARKS	100
Course Category	NCMC	Total SAAE hours/ semester	-	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	0			Exam Duration	-

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 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	4	Water conservation techniques – Role of different stakeholders- Implementation.

SEMESTER 3 SYLLABUS (Academic Year: 2025-2026)

B24NSK410	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.
	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
C01	Understand the importance of his / her responsibilities towards society.
C02	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
C03	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
C04	Implement government or self-driven projects effectively in the field.
C05	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

CO-PO-PSO Mapping

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

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
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.
<ul style="list-style-type: none"> • 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%	
Presentation - 1 Selection of topic, PHASE - 1	10 Marks	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.
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 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		

SEMESTER 3 SYLLABUS (Academic Year: 2025-2026)

	implementation approaches.		/ campus etc.....	board		
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	Total contact hours / week	2	CIE MARKS	100
Course Category	NCMC	Total SAAE hours/ semester	-	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	0			Exam Duration	Nil

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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
C01	-	-	-	-	-	-	-	3	-	-	3	-	-	-
C02	-	-	-	-	-	-	-	3	-	-	3	-	-	-
C03	-	-	-	-	-	-	-	3	-	-	3	-	-	-
C04	-	-	-	-	-	-	-	3	-	-	3	-	-	-
C05	-	-	-	-	-	-	-	3	-	-	3	-	-	-
C06	-	-	-	-	-	-	-	3	-	-	3	-	-	-
AVG	-	-	-	-	-	-	-	3	-	-	3	-	-	-

SEMESTER 3 SYLLABUS (Academic Year: 2025-2026)

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

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 (Semester 3)

Course Code	B24YOK391	Total contact hours / week	2	CIE MARKS	100
Course Category	NCMC	Total SAAE hours/ semester	-	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	0			Exam Duration	-

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	

FPGA System Design using Verilog

Course Code	B24EC41	Total contact hours / week	3	CIE MARKS	50
Course Category	PCC/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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Types of programmable logic devices, building blocks of FPGA and thus implement the design using Xilinx FPGAs.
2. Concepts of Advanced Logic design and implementation using Verilog HDL
3. Designing different Digital applications using SM chart.

PREREQUISITES

Basic Electronics, Design and analysis of Digital Circuits.

MODULE #	TOPICS	Hours
1	Introduction to Programmable Logic Devices: Brief overview of Programmable Logic Devices, Simple Programmable Logic Devices (SPLDs) Complex Programmable Logic devices (CPLDs), Field-Programmable Gate Arrays (FPGAs). (Textbook 1: 3.1,3.2,3.3,3.4)	08
2	Advanced Digital Design Examples: BCD to 7-Segment Display Decoder, BCD Adder, Traffic Light Controller, Synchronization and debouncing, Shift-and-Add Multiplier, Array Multiplier, Keypad Scanner (Excluding Test Bench) (Textbook 1:4.1, 4.2, 4.4, 4.7,4.8, 4.9,4.11)	08
3	SM Charts and Microprogramming: State Machine Charts, Derivation of SM Charts, SM chart for binary multiplier, Dice Game (Excluding Test Bench), Realization of SM Charts, Implementation of the Dice Game. Microprogramming, Linked State Machines. (Textbook 1: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6)	08
4	Floating-Point Arithmetic: Representation of Floating-Point Numbers, Floating-Point Addition, Other Floating-Point Operations. Multi valued Logic and Signal Resolution, Built-in Primitives, User-Defined Primitives, SRAM Model, Rise and Fall Delays of Gates, Model for SRAM Read/Write System, Rise and Fall Delays of Gates. (Textbook 1:7.1,7.3,7.4, 8.3, 8.4, 8.5,8.6 8.7,8.8)	08
5	Designing with Field Programmable Gate Arrays: Implementing Functions in FPGAs, Implementing Functions Using Shannon's Decomposition, Carry Chains in FPGAs, Cascade Chains in FPGAs, Examples of Logic Blocks in Commercial FPGAs, Dedicated Multipliers in FPGAs, FPGAs Capacity: Maximum gates versus Usable gates, Design Translation. (Textbook 1: 6.1,6.2,6.3, 6.4,6.5, 6.7, 6.10, 6.11)	10

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Digital Systems Design Using Verilog	Charls H. Roth Jr, Lizy K, John and Byeong K. Lee	1 st Edition	Cengage India Private Limited	2017

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Advanced FPGA Design: Architecture, Implementation, and Optimization	Steve Kilts	1 st Edition	Wiley-IEEE Press	2007
2	ASIC and FPGA Verification: A Guide to Component Modeling	Richard Munden	Illustrated	Morgan Kaufmann	2004
3	Processor Design: System-On-Chip Computing for ASICs and FPGAs	Jari Nurmi	1 st Edition	Springer	2007
4	The Design Warrior's Guide to FPGAs: Devices, Tools and Flows	Clive Maxfield	Reprint	Newnes	2004

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

Sl. #	Type of E-Resource	URL
1	MOOC's	<ul style="list-style-type: none"> https://www.nptelprep.in/courses/108103179/materials

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Apply the concept of Programmable logic devices to implement digital design.
CO2	Design and implementation of Advanced logic design using Verilog HDL.
CO3	Design complex digital circuits using SM Chart.
CO4	Performing the Floating-point arithmetic operations and designing of Memories.
CO5	Designing and performance evaluation of advanced digital design using FPGAs.

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
CO1	3	2	-	-	-	-	-	-	-	-	1	-	2	-
CO2	3	2	2	-	-	-	-	-	-	-	1	-	2	-
CO3	3	2	2	-	-	-	-	-	-	-	1	-	2	-
CO4	3	2	2	-	-	-	-	-	-	-	1	-	2	-
CO5	2	2	2	-	-	-	-	-	-	-	1	-	2	-
AVG	2.8	2	2	-	-	-	-	-	-	-	1	-	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. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical Thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Give Programming Assignments.

Principles of Communication Systems (Integrated)

Course Code	B24EC42	Total contact hours / week	5	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	4			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Generation and detection of Amplitude modulation.
2. Angle modulation and Demodulation.
3. Noise in Communication systems.
4. Sampling and Quantization techniques.
5. Base band Modulation techniques.

PREREQUISITES

Basic Electronics and Analog Electronics Circuits.

MODULE #	TOPICS	Hours
1	Amplitude Modulation: Introduction, AM- Time domain and frequency domain description, Single Tone Modulation, Generation of AM wave- Switching modulator, Detection of AM waves- Envelop detector. Double Side Band Suppressed Carrier Modulation-Time domain and Frequency domain description, Generation of DSBSC waves - Ring modulator, Coherent detection of DSBSC modulated wave and Costas loop receiver. (Textbook : 3.1, 3.2 and 3.3)	08
2	Sideband Modulation: Single sideband Modulation, Vestigial Side Band Modulation, and frequency Translation. (Text book : 3.5 and 3.7) Angle Modulation: Introduction, Basic Definitions, Properties of angle Modulated waves, Frequency Modulation- Narrow-Band FM, Wide-Band FM, Transmission bandwidth of FM signal and Generation of FM signals. (Textbook : 4.1, 4.2 and 4.3)	08
3	Angle Demodulation: Demodulations of FM signals: Balanced frequency discriminator, Phase-Locked Loop, Linear Model of the Phase-Locked Loop and Super Heterodyne Receiver. (Textbook : 4.3, 4.4 and 4.6) Noise in Analog Modulation: Shot Noise, Thermal noise, White Noise, Noise Equivalent Bandwidth, Noise figure, Noise temperature, SNR, Receiver Model, Noise in DSBSC Receivers, Noise in AM receivers and threshold effect. (Textbook : 5.10, 6.2, 6.3, and 6.4)	10
4	The Transition from Analog to Digital: Introduction, Why Digitize Analog Sources? The Sampling process, Pulse Amplitude Modulation, Pulse-Position Modulation, Generation of PPM Waves, Detection of PPM Waves, Bandwidth noise tradeoff, Quantization Process, Quantization Noise. (Textbook : 7.1, 7.2, 7.3, 7.4, 7.6 and 7.8)	08
5	Base Band Modulation Techniques: Pulse Code Modulation-Sampling, Quantization, Companding-A Law and μ Law Companding, Encoding - line codes,	08

SEMESTER 4 SYLLABUS (Academic Year: 2025-2026)

	T1 system, Regeneration, Decoding, Filtering, Multiplexing-: Time Division Multiplexing and Frequency Division Multiplexing, Delta modulation and Delta Sigma Modulation. (Textbook : 7.9, 7.5, 3.8 7 & 7.10)	
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Practical Component of IPCC(30 Hrs)

List of Experiments (use Hardware components and simulation tool)

1	Conduct an Experiment to Generate standard Amplitude Modulated wave and demodulate the same.
2	Conduct an Experiment to generate DSBSC wave and demodulate the same.
3	Conduct an Experiment to Generate Frequency Modulated wave using 8038 and demodulate the same.
4	Conduct an Experiment to Generate Pulse Amplitude Modulated wave and demodulate the same.
5	Conduct an Experiment to Generate Pulse width modulation.
6	Conduct an Experiment to Generate Pulse position modulation.
7	Conduct an experiment to Verify sampling theorem.
8	Simulation of Amplitude modulation and frequency domain analysis using MATLAB.
9	Simulation of Frequency modulation and frequency domain analysis using MATLAB.
10	Simulate to verify Sampling theorem using MATLAB.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Communication Systems	Simon Haykins and Moher	5 th Edition	John Willey India Pvt.	2010

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	An Introduction to Analog and Digital Communication	Simon Haykins	2 nd Edition	John Wiley India Pvt.Ltd	2012
2	Digital and Analog Communication systems	K. Sam Shanmugam	Student Edition	Willey, India Pvt. Ltd,	2015

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

Sl. #	Type of E-Resource	URL
1	Online	<ul style="list-style-type: none"> • https://nptel.ac.in/courses/108/104/108104091/ • https://nptel.ac.in/courses/108/104/108104098/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Illustrate the process of generation and detection of amplitude modulation techniques used in analog communication systems.
CO2	Apply the concept of angle modulation for generation and detection of FM signals.
CO3	Describe the various types of noises and its performance on modulation techniques.
CO4	Analyze the digital representation of analog signals on modulation techniques.
CO5	Elaborate the operation of base band modulation techniques.

CO-PO-PSO Mapping

SEMESTER 4 SYLLABUS (Academic Year: 2025-2026)

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

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical Thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.

Signals and Systems (Integrated)

Course Code	B24EC43	Total contact hours / week	5	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	4			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Mathematical description of continuous and discrete time signals and systems.
2. LTI Systems and properties.
3. Fourier Representation of Signals and LTI Systems.
4. Non periodic signals using Fourier Transforms.
5. Z-Transforms and its properties.

PREREQUISITES

Engineering Mathematics-II and Fourier series, transforms and Probability distribution.

MODULE #	TOPICS	Hours
1	Introduction and Classification of signals: Definition of signal and systems, Classification of signals. Basic Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shift and time reversal. Elementary signals/Functions: Exponential, sinusoidal, step, impulse, and ramp functions.	10
2	Properties of Systems: Linear-nonlinear, Time variant-invariant, causal, non-causal, static-dynamic, stable-unstable, invertible. Time domain representation of LTI Systems: Impulse response, convolution sum, convolution integral. Computation of convolution sum and convolution integral using graphical method for unit step and unit step, unit step and exponential.	08
3	Fourier Representation of Signals and LTI Systems: Discrete- Time Periodic Signals: The Discrete-Time Fourier Series, Continuous-Time Periodic Signals: The Fourier Series, basic problems. CTFS and DTFS properties (Analytical treatment).	08
4	Fourier Representation of Non-Periodic Signals: Introduction, Discrete-Time Non-Periodic Signals: The Discrete-Time Fourier Transform, Continuous-Time Non-Periodic Signals: The Fourier Transform, Inverse Fourier Transforms. Properties of Fourier Transform (Analytical treatment), problems on properties of Fourier Transform.	08
5	Z-Transforms: Z-transform, properties of the Region of Convergence, properties of the Z-transform, Inverse Z-transforms, unilateral Z-transform and Transform Analysis of LTI systems-pole-Zero plots, causality and stability in terms of Z- transforms .	08

Practical Component of IPCC(30 Hrs)

List of Programs to be implemented & executed using any programming languages like Moku:Go/ MATLAB/OCTAVE (but not limited to)

1	Program to create, display and modify a matrix.
2	Program to solve system of linear equations.
3	Program to generate the following discrete time signals. a) Unit sample sequence, b) Unit step sequence, c) Exponential sequence, d) Sinusoidal sequence, e) Random sequence.
4	Program to perform the following operations on signals. a) Signal addition, b) Signal multiplication, c) Scaling, d) Shifting, e) Folding.
5	Program to perform convolution of two given sequences (without using built-in function) and display the signals.
6	Consider a causal system $y(n) = 0.9y(n-1)+x(n)$. a) Determine $H(z)$ and sketch its pole zero plot. b) Plot $ H(ej\omega) $ and $\angle H(ej\omega)$. c) Determine the impulse response $h(n)$.
7	Given the input signal, program to find the response of a system.
8	For a given network circuit find the impulse response and unit step response of a system.
9	Program to perform verification of properties of convolution sum.
10	Program to compute frequency response of a system.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Signals and Systems	Simon Haykin and Barry Van Veen	2 nd Edition	Wiley India	2008

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Signals and Systems	Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab	2 nd Edition	Pearson Education	2002
2	Fundamentals of Signals and Systems	Michael Roberts	2 nd Edition	Tata McGraw-Hill	2010

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

Sl. No.	Type of E-Resource	URL
1	NPTEL	<ul style="list-style-type: none"> • https://nptel.ac.in/courses/108/104/108104100/ • https://nptel.ac.in/courses/108/106/108106163/ • https://nptel.ac.in/courses/117/101/117101055/
2	MOOCs	https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Solve the both Continuous time Discrete time signals with various operations.
CO2	Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum.
CO3	Analyze the frequency response of a given arbitrary periodic CTS/ DTS using Fourier series and its properties.
CO4	Determine frequency response of a given arbitrary Non-periodic CTS/DTS using Fourier transforms and its properties.
CO5	Compute the Z-transforms, inverse Z- transforms and transfer functions of complex LTI systems.

CO-PO-PSO Mapping

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

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain the different concepts of Linear Algebra & Signal Processing.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in a multiple representation.
7. Show the different ways to solve the same problem 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.
9. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes, Give Programming Assignments.

Microcontroller

Course Code	B24EC44	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Difference between Microprocessor and Microcontroller and embedded microcontrollers.
2. Basic architecture of 8051 microcontroller.
3. Programming of 8051 microcontroller using Assembly Language and C.
4. Operation and use of inbuilt Timers/Counters and Serial port of 8051.
5. Interrupt structure of 8051 and Interfacing I/O devices using I/O ports of 8051.

PREREQUISITES

Programming in C

MODULE #	TOPICS	Hours
1	Microcontroller: Microcontroller Overview, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing, 8051 Addressing Modes. (Textbook 1-1.1, Textbook 2-1.0,1.1,3.0,3.1,3.2,3.3 Textbook 3-Pg 5-9)	08
2	Instruction Set: Data Transfer Instructions, Arithmetic instructions, Logical Instructions, Jump & Call Instructions Stack & Subroutine Instructions of 8051 (with examples in assembly Language). (Textbook 2- Chapter 5,6,7,8, Additional reading Refer Textbook 3, Chapter 3 for complete understanding of instructions with flow diagrams)	08
3	Timers/Counters & Serial port programming: Basics of Timers & Counters, Data types & Time delay in the 8051 using C, Programming 8051 Timers, Mode 1 & Mode 2 Programming, Counter Programming (Assembly Language only). (Textbook 2- 3.4, Textbook 1- 7.1, 9.1,9.2) Basics of Serial Communication, 8051 Connection to RS232, Programming the 8051 to transfer data serially & to receive data serially using C. (Textbook 2- 3.5, Textbook 1- 10.1,10.2,10.3 except assembly language programs, 10.5)	10
4	Interrupt Programming: 8051 Interrupts, Programming Timer Interrupts, Programming Serial Communication Interrupts (Assembly Language only) (Textbook 2- 3.6, Textbook 1-11.1,11.2,11.4, 11.5) I/O Port Interfacing & Programming: I/O Programming in 8051 C, LCD interfacing, DAC 0808 Interfacing, ADC 0804 interfacing, Stepper motor interfacing, DC motor control (C only). (Textbook 1- 7.2, 12.1, 13.1, 13.2, 17.2, 17.3)	08
5	Advanced Microcontrollers: Arduino UNO -Hardware overview & features, ESP32 - Hardware overview & features, Simple programs (LED blinking, sensor interfacing), Applications with Arduino UNO & ESP32 - Line	08

SEMESTER 4 SYLLABUS (Academic Year: 2025-2026)

	follower robot, Obstacle sensing system, Object counting system. (Open Source and Reference Textbook)	
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PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	The 8051 Microcontroller and Embedded Systems – Using Assembly and C	Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollind. Mckinlay; Phi	2 nd Edition	Pearson	2006
2	The 8051 Microcontroller	Kenneth j. Ayala	3 rd Edition	Thomson/Cengage Learning	2007
3	Programming And Customizing The 8051 Microcontroller	Myke Predko	reprint 2003	Tata Mc Graw-Hil	1999

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	The 8051 Microcontroller Based Embedded Systems	Manish K Patel	1 st Edition	McGraw Hill	2017
2	Microcontrollers: Architecture, Programming, Interfacing and System Design	RajKamal D.	1 st Edition	Pearson Education	2005
3	Introduction to Embedded Systems	Shibu K V	2 nd Edition	Tata McGraw Hill	2019

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

Sl. #	Type of E-Resource	URL
1	Video Lecture	https://youtu.be/pA6K5NgWTow?si=zQqqgXQq50dVL_s

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Describe the difference between Microprocessor and Microcontroller, Types of Processor Architectures and Architecture of 8051Microcontroller.
CO2	Discuss the types of 8051 Microcontroller Addressing modes & Instructions with Assembly Language Programs.
CO3	Explain the programming operation of Timers/Counters and Serial port of 8051 Microcontroller.
CO4	Illustrate the Interrupt Structure of 8051 Microcontroller & its programming.
CO5	Develop C programs to interface I/O devices with 8051 Microcontroller.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
C01	3	2	-	-	-	-	-	-	-	-	2	1	2	-
C02	3	2	3	-	-	-	-	-	-	-	2	1	2	-
C03	3	2	3	-	-	-	-	-	-	-	2	1	3	-
C04	3	2	3	3	-	-	-	-	-	-	2	1	3	-
C05	3	2	3	2	3	-	-	-	-	-	2	1	3	-
AVG	3	2	3	2.5	3	-	-	-	-	-	2	1	2.6	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Encourage collaborative (Group) Learning in the class.
3. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
5. Topics will be introduced in a multiple representation.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.
9. Give Programming Assignments.

Data Structures

Course Code	B24EC451	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Basic Concepts Of Dynamic Memory Allocation.
2. Working Principle Of Different Types Of Data Structures.
3. To Identify And Apply the Appropriate Data Structure to Solve a Given Problem.
4. To Develop Applications Using Data Structure Algorithms.

PREREQUISITES

Basic knowledge of C Programming.

MODULE #	TOPICS	Hours
1	<p>Introduction: Data Structures, Classifications (Primitive & Non-Primitive), Data structure operations (T1).</p> <p>The Stack: Definition and Examples— Primitive operations, examples.</p> <p>Representing Stacks in C: Implementing the POP operation, testing for exceptional conditions, implementing the PUSH operation an Example: Infix, Postfix, and Prefix – Basic definitions and examples.</p> <p>Stack Applications – Recursive Definition and Processes, Tower of Hanoi, conversion of infix to prefix and postfix, Evaluating a postfix expression. (Textbook 1: - Chapter: 6.1 to 6.9)</p>	08
2	<p>Queues: The Queue and its Sequential Representation: C Implementation of Queues, primitive operations on Queue, Array Implementation of a Priority Queue, circular Queue, Priority Queue, double ended queue. (Textbook 1: - Chapter: 6.11 to 6.17)</p>	08
3	<p>Dynamic Memory Allocation: Introduction, Dynamic Memory Allocation, allocating a Block of Memory: malloc, Releasing the Used Space: Free. (Textbook 1-Chapter: 1.2.2)</p> <p>Linked List Introduction and definition, representation of linked list in memory, primitive operations on linked list, Linked Implementation of Stacks, Linked Implementation of Queues. (Textbook 1: - Chapter: 5.1 to 5.8)</p>	10
4	<p>Other list structures - Header linked lists, Circular lists and its primitive operations, doubly linked lists and its primitive operations. (Textbook 1: Chapter: 5.9 to 5.11)</p>	08
5	<p>Binary Trees: Introduction and definition, Node Representation of Binary Trees, Representation of Binary Trees, Primitive operations on Binary Tree, Binary search tree and its primitive operations (Textbook 1: Chapter: 7.1 to 7.4 and 7.8 to 7.10)</p>	08

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Data Structures with C	Seymour Lipschutz	Special Indian Edition, 13 th Reprint	McGraw Hill	2015
2	Fundamentals of Data Structures in C	Ellis Horowitz, Sartaz Sahni, Anderson, Freed	2 nd Edition	University press	2008

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Data Structures using C	E. Balagurusamy	Tenth reprint	Mc. Graw Hill Education	2017
2	Data Structures A Pseudo code approach with C	Richard F. Gilberg and Behrouz A. Forouzan	2 nd Edition	Cengage Learning	2005

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

Sl. #	Type of E-Resource	URL
1	MOOC's	<ul style="list-style-type: none"> • https://nptel.ac.in/courses/107/106/107106081/ • https://nptel.ac.in/courses/108/106/108106098/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Comprehend different types of data structures and its applications for programming and problem solving.
CO2	Explain and implement the operational aspects of stacks in problem solving.
CO3	Explain and implement the operational aspects of queues in problem solving.
CO4	Implement operations on linked lists and demonstrate their applications.
CO5	Implement various operations on trees.

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	-	2	-
CO4	3	2	1	-	-	-	-	-	-	-	1	-	2	-
CO5	3	2	1	-	-	-	-	-	-	-	1	-	2	-
AVG	3	2	1	-	-	-	-	-	-	-	1	-	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. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Encourage collaborative (Group) Learning in the class.
3. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
5. Topics will be introduced in a multiple representation.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.
9. Give Programming Assignments.

Control Systems

Course Code	B24EC452	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Fundamental concepts and applications of control systems.
2. Mathematical modeling of Mechanical, Electrical, and Electro-Mechanical systems.
3. Time and frequency response of the system.
4. Stability of the system using graphical techniques.
5. Concept of state variable and state model for continuous time systems.

PREREQUISITES

Basic understanding of mathematics, especially calculus and differential equations, as well as fundamental knowledge of electrical circuits.

MODULE #	TOPICS	Hours
1	Introduction to Control Systems: Introduction, Types of Control Systems, Effect of Feedback Systems, Differential equation of Physical Systems– Mechanical Systems, Electrical Systems, Electromechanical systems and Analogous Systems. (Textbook: 1.1, 2.1.2.2)	08
2	Block diagrams and signal flow graphs: Transfer functions, Block diagram, algebra, and Signal Flow graphs, Illustrative examples. (Textbook: 2.4 to 2.7)	08
3	Time Response of Feedback Control Systems: Introduction, Standard test signals, Unit step response of First and Second Order Systems. Time response specifications, Time response specifications of second order systems, Steady state errors, and Error constants. (Textbook: 5.1 to 5.5, 5.7)	08
4	Stability analysis: The Concepts of stability, Necessary conditions for Stability, Routh stability criterion, Relative stability analysis, More on the Routh stability criterion. Root Locus and Bode plots: Introduction to Root-Locus Techniques, Root Locus Concepts and Construction of Root loci. (Textbook: 6.1 to 6.6, 7.1 to 7.3, 8.4)	08
5	Frequency domain analysis and stability: Correlation between time and frequency response, Bode Plots, Experimental determination of transfer function. (Textbook 1: Chapter 4: 8.1, 8.2, 8.4) Mathematical preliminaries, Nyquist Stability criterion, (Stability criteria related to polar plots are excluded) (Textbook: 9.2, 9.3) State Variable Analysis: Introduction to state variable analysis: Concepts of state, state variable and state models. State model for Linear continuous – Time systems, solution of state equations. (Textbook: 12.2, 12.3, 12.6)	10

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Control Systems Engineering	I.J. Nagrath and M.Gopal	5 th edition	New age International(P) Ltd.	2011

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Automatic Control Systems	Benjamin C. Kuo,	8 th Edition	John Wiley India Pvt. Ltd	2008
2	Modern Control Engineering	Ogata	4 th Edition	Pearson Education	2002

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

Sl. #	Type of E-Resource	URL
1	MOOC'S	<ul style="list-style-type: none"> • https://nptel.ac.in/courses/107/106/107106081/ • https://nptel.ac.in/courses/108/106/108106098/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Explain the concepts of control systems and their applications.
CO2	Analyze the mechanical and electrical systems using block diagram reduction techniques and Signal Flow graphs to find the overall transfer function.
CO3	Describe quantitative analysis of the transient response of first and second-order systems.
CO4	Compute the RH criteria, Root locus and Nyquist criterion to check the stability of the systems.
CO5	Analyze the state variable and state model for continuous time systems.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	-	-	-	-	-	-	-	-	-	1	1	-
CO2	3	2	2	-	-	-	-	-	-	-	-	3	2	-
CO3	2	1	2	-	-	-	-	-	-	-	-	2	1	-
CO4	3	2	2	1	1	-	-	-	-	-	1	3	2	-
CO5	2	2	2	1	1	-	-	-	-	-	1	2	2	-
AVG	2.2	1.6	2	1	1	-	-	-	-	-	1	2.2	1.6	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

Engineering Electromagnetics

Course Code	B24EC453	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Coulomb's Law, Electric Field Intensity and Flux density.
2. Gauss's law and Divergence.
3. Electric and magnetic field parameters using various static Electromagnetic Laws.
4. Maxwell's equations for static and time varying Fields.
5. Concept of Uniform Plane waves.

PREREQUISITES

Electricity and magnetism at the level of high-school, Vector analysis, Differential and integral calculus.

MODULE #	TOPICS	Hours
1	Coulomb's Law, Electric Field Intensity and Flux density: Experimental law of Coulomb, Electric field intensity, Field due to continuous volume charge distribution, Field of a line charge, Field of sheet of charge & Electric flux density. (Textbook 1: 2.1 to 2.5 and 3.1)	08
2	Gauss's law and Divergence: Gauss' law, Application of Gauss law: Some Symmetrical Charge Distributions, Applications of Gauss Law: Differential Volume Element, Divergence, Maxwell's First equation, Vector Operator del & Divergence theorem. (Textbook 1: 3.2 to 3.7) Energy, Potential and Conductors: Energy expended in moving a point charge in an electric field, The line integral, Definition of potential difference and potential & The potential field of point charge. (Textbook 1: 4.1 to 4.4)	10
3	Steady Magnetic Field: Current and Current density, Continuity of current. Biot-Savart Law, Ampere's circuital law, Curl, Stokes' theorem, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic Potentials. (Textbook 1: 5.1, 5.2 and 8.1 to 8.5)	08
4	Magnetic Forces and Maxwell's Equations: Force on a moving charge, differential current elements, Force between differential current elements - Numerical Problems. Faraday's law, displacement current, Maxwell's equations in point form, Maxwell's equations in integral form for static and time varying fields. (Textbook 1: 9.1, 9.2, 9.3, 10.1 to 10.4)	08
5	Uniform Plane Wave: Wave propagation in free space, Wave propagation in Dielectrics, Poynting's Theorem, Propagation in good conductors: Skin effect. (Textbook 1: 12.1 to 12.4)	08

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Engineering Electromagnetics	W.H. Hayt and J.A. Buck	7 th Edition	Tata McGraw-Hill	2009

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Elements of Electromagnetics	Matthew N O Sadiku	4 th Edition	Oxford University Press	2007
2	Electromagnetic Waves and Radiating Systems	Edward C. Jordan and Keith G Balmain	2 nd edition	Prentice Hall of India	2002
3	Electromagnetics with Applications	John Krauss and Daniel A. Fleisch	5 th edition	Tata McGraw Hill	1999

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

Sl. #	Type of E-Resource	URL
1	Online	<ul style="list-style-type: none"> • https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-ee04 • https://www.edx.org/course/electricity-and-magnetism-maxwells-equations • https://www.coursera.org/lecture/electrodynamics-introduction/1-1-introduction-to-electromagnetism-qiQb

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Apply the concept of Coulomb’s law and Electric field Intensity to determine Electrostatic force and Field
CO2	Apply Guass’s law, Divergence and potential to solve problems on various charge distributions.
CO3	Analyze different laws of Steady magnetic field to solve engineering Problems.
CO4	Explain magnetic forces and Maxwells equations.
CO5	Discuss wave propagation in various media.

CO-PO-PSO Mapping

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

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

Introduction to AI

Course Code	B24EC454	Total contact hours / week	3	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	3			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Basics of artificial intelligence and its subfields.
2. Explore real-world applications of AI across different industries.
3. Gain insights into the ethical, social, and economic implications of AI.
4. Develop an appreciation for the potential of AI to drive innovation and transformation.

PREREQUISITES

Knowledge of Calculus, Probability and Statistics.

MODULE #	TOPICS	Hours
1	Artificial Intelligence: History and Applications Eden to ENIAC: Attitudes toward intelligence, knowledge and Human artifice, Overview of AI application areas. (Textbook : 1.1, 1.2)	08
2	Artificial Intelligence as Representation and Search The Predicate Calculus: Introduction, the propositional Calculus, the predicate calculus, Using Inference rules to produce predicate calculus expressions, Application: A logic-based financial Advisor. (Textbook: 2.0, 2.2, 2.3, 2.4) Structure and Strategies for State Space Search: Introduction, Graph Theory, Strategies for State Space Search, Using the state space to represent reasoning with predicate calculus. (Textbook : 3.0, 3.1.1, 3.2, 3.3)	08
3	Heuristic Search and Stochastic Methods Heuristic Search: Introduction, Hill Climbing and Dynamic Programming, the best-first search algorithm, admissibility, monotonicity, and Informedness, Using Heuristics in Games, Complexity Issues. (Textbook: 4.0, 4.1, 4.2, 4.3, 4.4, 4.5) Stochastic Methods: Introduction, the elements of counting, elements of probability theory, Bayes theorem, applications of stochastic methodology, Recursion-based search. (Textbook : 5.0, 5.1, 5.2, 5.3, 5.4, 6.1)	10
4	Strong Method Problem Solving Introduction, Overview of Expert System Technology, Rule-Based Expert systems, Model Based, Case Based and Hybrid Based Systems, Planning. (Textbook: 8.0, 8.1, 8.2, 8.3, 8.4)	08
5	Machine Learning: Introduction, A framework for symbol based learning, version space search, the ID3 decision tree induction algorithm, inductive bias and learnability, knowledge and learning, unsupervised learning, reinforcement learning.(Textbook: 10.0, 10.1,10.2, 10.3, 10.4, 10.5, 10.6, 10.7)	08

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence, Structures and Strategies for Complex Problem Solving	George F Luger	6 th Edition	Pearson Education	2008

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Artificial Intelligence - A Modern Approach	Stuart Russell and Peter Norvig	3 rd Edition	Pearson	2014
2	Introduction to Artificial Intelligence and Expert Systems	Dan W Patterson	1 st Edition	Pearson	2015
3	Artificial Intelligence and Intelligent Systems	N P Padhy	1 st Edition	Oxford Publication	2017

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

Sl. #	Type of E-Resource	URL
1	E-Books	<ul style="list-style-type: none"> • https://people.engr.tamu.edu/guni/csce421/files/AI_Russell_Norvig.pdf
2	MOOC's	<ul style="list-style-type: none"> • https://onlinecourses.nptel.ac.in/noc23_cs92/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Understand the difference between cognitive and artificial intelligence.
CO2	Apply the characteristics and architectures of various expert systems that differentiate it from the conventional systems.
CO3	Analyze knowledge of genetic algorithms and swarm intelligence with their principles and procedures.

CO-PO-PSO Mapping

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

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

BIOLOGY FOR ENGINEERS

Course Code	B24BOE46	Total contact hours / week	1	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	1			Exam Duration	1

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 biodesign 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	02

SEMESTER 4 SYLLABUS (Academic Year: 2025-2026)

	(flight aerodynamics), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Shark skin (Friction reducing swimsuits), Kingfisher beak (Bullet train).	
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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		N Publishing, Bengaluru,	2023.
2	Human Physiology	Stuart Fox, Krista Rompolski	16th Edition	McGraw-Hill eBook	2022
3	Biosensors: essentials.	Evtugyn, Gennady.	Vol. 84.	Springer Berlin Heidelberg	2014
4	Biomimetics: Nature-Based Innovation	Yoseph Bar-Cohen	1st 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.		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

SEMESTER 4 SYLLABUS (Academic Year: 2025-2026)

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	-	-	-
CO2	3	3	3	3	-	-	-	3	-	-	3	-	-	-
CO3	3	3	3	3	-	-	-	3	-	-	3	-	-	-
CO4	3	3	3	3	-	-	-	3	-	-	3	-	-	-
AVG	3	3	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) 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

Programmable Logic Controllers

Course Code	B24EC471	Total contact hours / week	1	CIE MARKS	50
Course Category	AEC	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	1			Exam Duration	1

COURSE LEARNING OBJECTIVES

1. Need for automation in the industry with basic controller mechanisms involved.
2. Programming concepts to achieve the desired goal or to define the various steps involved in the automation.
3. Programming involved with basic subroutine functions.
4. Internal hardware circuits of automation circuit to control the devices during various states by monitoring the timers and counters.
5. Interface the data with the controller and auxiliary devices.

PREREQUISITES

Basic knowledge of Electrical and mechanical engineering.

MODULE #	TOPICS	Hours
1	Introduction: Programmable logic controller (PLC), role in automation (SCADA), advantages and disadvantages, hardware, internal architecture, sourcing and sinking. (Textbook: 1.1 to 1.4) I/O devices and Processing: list of input and output devices, examples of applications. I/O processing, input/output units, signal conditioning, remote connections, networks, processing inputs I/O addresses. (Textbook: 2.1 to 2.3 and 4.1 to 4.7).	03
2	Programming: Ladder programming- ladder diagrams, logic functions, latching, multiple outputs, entering programs, functional blocks, program examples like location of stop and emergency switches. (Textbook: 5.1 to 5.7).	03
3	Programming Methods: Instruction Lists- Ladder programs and Instruction lists, Branch codes, Programming Examples- Signal lamp-valve operation task. Sequential Function Charts- Branching and convergence. (Textbook: 6.1 to 6.3).	03
4	Internal Relays: ladder programs, battery-backed relays, one-shot operation, set and reset, master control relay. (Textbook: 7.1 to 7.6). Timers and counters: Types of timers, ON and OFF- delay timers, pulse timers, forms of counter, programming, up and down counters. (Textbook: 9.1 to 9.6).	03
5	Shift register and data handling: shift registers, ladder programs, registers and bits, data handling, arithmetic functions. (Textbook: 11.1 to 11.2 and 12.1 to 12.3)	02

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Programmable Logic controllers	W Bolton	6 th Edition	Elsevier-newness	2015

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Programmable Logic Controllers	E. A Paar	3 rd Edition	An Engineers Guide. Newness	2003
2	Introduction to Programmable Logic Controller	Garry Dunning	3 rd Edition	Thomson Asia Pte Ltd.	2006

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://archive.nptel.ac.in/courses/108/105/108105063/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Describe the PLC and how to construct PLC ladder diagrams.
CO2	Illustrate an application with programming.
CO3	Describe characteristics of registers and conversion examples.
CO4	Apply PLC functions to timing and counting applications.
CO5	Analyze the analog operation of PLC and demonstrate the robot applications with PLC.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
CO3	1	2	-	-	-	-	-	-	-	-	1	1	-	-
CO4	3	3	2	-	-	-	1	-	-	-	1	2	1	-
CO5	2	1	-	-	-	-	1	-	-	-	1	2	1	-
AVG	1.8	1.6	1.5	-	-	-	1	-	-	-	1	1.4	1	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain evolution of communication technologies.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

Microcontroller Laboratory

Course Code	B24EC472	Total contact hours / week	2	CIE MARKS	50
Course Category	AEC	Total SAAE hours/ semester	-	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	1			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. Basic programming of Microcontrollers.
2. 8051 Microcontroller-based programs for various applications using Assembly Language & C Programming.
3. Program 8051 Microcontroller to control an external hardware using suitable I/O ports.

PREREQUISITES

Programming in C

Note	Execute the following experiments by using Keil Microvision Simulator (any 8051 Microcontroller can be chosen as the target) and Hardware Interfacing Programs using 8051 Trainer Kit.
Sl. #	I. Assembly Language Programming
Data Transfer Programs	
1	Write an ALP to move a block of n bytes of data from source (20h) to destination (40h) using Internal-RAM.
2	Write an ALP to move a block of n bytes of data from source (2000h) to destination (2050h) using External RAM.
3	Write an ALP To exchange the source block starting with address 20h, (Internal RAM) containing N (05) bytes of data with destination block starting with address 40h (Internal RAM).
4	Write an ALP to exchange the source block starting with address 10h (Internal memory), containing n (06) bytes of data with destination block starting at location 00h (External memory).
Arithmetic & Logical Operation Programs:	
5	Write an ALP to add, Subtract, multiply and divide the byte in the RAM at 34h and 35h, store the result in the register R5 (LSB) and R6 (MSB), using Indirect Addressing Mode.
6	Write an ALP to separate even or odd elements in a given array.
7	Write an ALP to arrange the numbers in Ascending & Descending order.
8	Write an ALP to find Largest & Smallest number from a given array starting from 20h & store it in Internal Memory location 40h.
Counter Operation Programs:	
9	Write an ALP for Decimal and Hexadecimal UP/DOWN Counter.
II. C Programming	
10	Write an 8051 C program to find the sum of first 10 Integer Numbers and also Square of a number (1 to 10) using Look-Up Table.
11	Write an 8051 C program to find Factorial of a given number.

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12	Write an 8051 C program to count the number of Ones and Zeros in two consecutive memory locations.
III. Hardware Interfacing Programs	
13	Write an 8051 C Program to rotate stepper motor in Clock & Anti-Clockwise direction.
14	Write an 8051 C program to Generate Sine & Square waveforms using DAC interface.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	The 8051 Microcontroller: Hardware, Software and Applications	V Udayashankara and M S Mallikarjuna Swamy	1st edition	McGraw Hill Education	2017

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	The 8051 Microcontroller and Embedded Systems - Using Assembly and C	Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollind. Mckinlay; Phi	2 nd Edition	Pearson	2007
2	The 8051 Microcontroller	Kenneth j. Ayala	3 rd Edition	Thomson/Cengage Learning.	2007

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://archive.nptel.ac.in/courses/108/105/108105102/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Write a Assembly Language/Cprograms in 8051 for solving simple problems that manipulate input data using different instructions.
CO2	Develop Testing and experimental procedures on 8051 Microcontroller, Analyze their operation under different cases.
CO3	Develop programs for 8051 Microcontroller to implement real world problems.
CO4	Develop Microcontroller applications using external hardware interface.

CO-PO-PSO Mapping

CO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	PS01	PS02	PS03
CO1	2	1	-	-	2	-	-	-	-	-	-	1	-	-
CO2	1	1	1	-	2	-	-	-	-	-	-	1	1	-
CO3	1	2	-	-	2	-	-	-	-	-	1	1	-	-
CO4	3	3	2	-	2	-	1	-	-	-	1	2	1	-
AVG	1.75	1.75	1.5	-	2	-	1	-	-	-	1	1.25	1	-

Data structures Lab Using C

Course Code	B24EC473	Total contact hours / week	2	CIE MARKS	50
Course Category	AEC	Total SAAE hours/ semester	-	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

COURSE LEARNING OBJECTIVES

1. Data structures and algorithms to practical programming tasks.
2. Implementing and debugging data structures and algorithms through coding exercises and projects.

PREREQUISITES

Basic logical thinking, C/C++ Programming.

Sl. #	Experiments
1	Develop a C program to sort the elements of an array using Radix sort technique.
2	Develop a C program to sort the elements of an array using Merge sort technique.
3	Develop a C Program to implement Hashing using Linear and Quadratic Probing.
4	Develop a menu driven program in C to implement primitive operations on stack a) Push b) Pop c) Display. The program should print appropriate messages for stack overflow and stack underflow.
5	Develop a C program to convert INFIX notation to POSTFIX notation.
6	Develop a C program for evaluation of POSTFIX notation.
7	Develop a menu driven program in C language to implement QUEUE data structures that performs following primitive operations: a) insert b) delete and c) display .
8	Develop a menu driven program in C language to for CIRCULAR QUEUE that performs following primitive operations: a) insert b) delete and c) display.
9	Develop a menu driven program in C to perform primitive operations on single linked list.
10	Develop a C program to perform insertion, deletion, and traversal of a binary search tree.
Note: The students must be encouraged to create Leetcode account and work on Leetcode platform to improve the competency.	

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Data Structure- A Pseudo code approach with C	Gilberg and Forouzan	2 nd Edition	Thomson publication	2004
2	Data structure in C	Tanenbaum	2 nd Edition	PHI / Pearson publication	2011
3	Data Structures & Algorithms; Concepts, Techniques & Algorithms	Pai	1 st Edition	Tata McGraw Hill	2017

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Fundamentals of data structure in C	Horowitz, Sahani & Freed	2 nd Edition	Computer Science Press	2007
2	Fundamental of Data Structure (Schaums Series)	Seymour Lipschutz	Revised Edition 1 st	Tata-McGraw-Hill.	2014

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

Sl. #	Type of E-Resource	URL
1	MOOC's	https://archive.nptel.ac.in/courses/106/102/106102064/

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Develop programs related to applications of arrays.
CO2	Develop programs related to stacks and its applications.
CO3	Develop programs related to queues.
CO4	Demonstrate use of dynamic memory allocation to implement single linked list .
CO5	Develop programs related to trees.

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	-
CO2	3	3	3	-	3	-	3	-	-	-	-	-	3	-
CO3	3	3	3	-	3	-	3	-	-	-	-	-	3	-
CO4	3	3	3	-	3	-	3	-	-	-	-	-	3	-
CO5	3	3	3	-	3	-	3	-	-	-	-	-	3	-
AVG	3	3	3	-	3	-	3	-	-	-	-	-	3	-

Digital Switching Systems

Course Code	B24EC474	Total contact hours / week	1	CIE MARKS	50
Course Category	AEC	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	1			Exam Duration	1

COURSE LEARNING OBJECTIVES

1. Basics of telecommunication networks and digital transmission of data.
2. Evolution of switching systems and the digital switching.
3. Telecommunication traffic and its measurements.
4. Technologies associated with the data switching operations.
5. Use of software for the switching and its maintenance.

PREREQUISITES

Basic Electronics

MODULE #	TOPICS	Hours
1	Development of telecommunications: Network structure, Network services, terminology, Regulation, Standards. Introduction to telecommunications transmission, Power levels, Four wire circuits, Digital transmission, FDM, TDM, PDH and SDH. (Textbook 1: 1.1-1.4, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6)	03
2	Evolution of switching systems: Introduction, Message switching, Circuit switching, Functions of switching systems, Distribution frames, Electronic switching. (Textbook 1: 3.1-3.5, 3.8, 3.11) Switching system fundamentals: Introduction, Digital Switching System Analysis, Basic Central Office Linkages, switching system hierarchy, Evolution of digital switching systems, Stored program control switching systems, Digital Switching System Fundamentals, Building blocks of a digital switching system, Basic call processing. (Textbook 2:1.1-1.4)	04
3	Telecommunication Traffic: Introduction, the unit of Traffic, Congestion, Traffic measurement, a mathematical model, lost call systems, Queuing systems. Switching Networks: Introduction, Single stage Networks, Grading, Link Systems. (Textbook 1: 4.1-4.7, 5.1-5.4)	03
4	Maintenance of Digital Switching Systems: Introduction, Software Maintenance, Interfaces of a Typical Digital Switching System Central Office, Impact of Software Patches on Digital Switching Systems Maintainability, Growth of Digital Switching System Central Offices, A methodology for Reporting and Correction of Field Problems, Diagnostic Capabilities for Proper Maintenance of Digital Switching System. (Textbook 2: 7.1, 7.3, 7.4, 7.6, 7.7, 7.8, 7.9)	04

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Telecommunications Switching, Traffic and Networks	E Flood	22 nd Impression	Pearson Education Ltd	2016
2	Digital Switching Systems	Syed R. Ali	16 th reprint	McGraw Hill Education (india) Pvt Ltd.	2018

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	Digital Telephony	John C Bellamy	3 rd Edition	Wiley India Pvt. Ltd	2008

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

Sl. #	Type of E-Resource	URL
1	MOOC's	<ul style="list-style-type: none"> https://onlinecourses.nptel.ac.in/noc19_ee52/preview

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Describe the electromechanical switching systems and its comparison with the digital switching.
CO2	Describe the building blocks of digital switching systems and its functions.
CO3	Determine the telecommunication traffic and its measurements.
CO4	Explain the technologies associated with the data switching operations.
CO5	Elaborate the software aspects of switching systems and its maintenance.

CO-PO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	1	1	1	-	-	-	-	-	-	-	-	1	1	-
CO3	1	2	-	-	-	-	-	-	-	-	1	1	-	-
CO4	3	3	2	-	-	-	1	-	-	-	1	2	1	-
CO5	2	1	-	-	-	-	1	-	-	-	1	2	1	-
AVG	1.8	1.6	1.5	-	-	-	1	-	-	-	1	1.4	1	-

Teaching-Learning Process Pedagogy (General Instructions):

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

1. Lecture method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Encourage collaborative (Group) Learning in the class.
3. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
5. Topics will be introduced in a multiple representation.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.
8. Adopt Flipped class technique by sharing the materials / Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

UNIVERSAL HUMAN VALUES

Course Code	B24UHK48	Total contact hours / week	1	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	1			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	03
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	03

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	in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	
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	03
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	02
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	03

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 Edition	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:

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

FPGA System Design Using Verilog Laboratory

Course Code	B24ECL49	Total contact hours / week	2	CIE MARKS	50
Course Category	PCCL	Total SAAE hours/ semester	-	SEE MARKS	50
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	1			Exam Duration	3

COURSE LEARNING OBJECTIVES

1. FPGA Design flow for VLSI Chip Design.
2. Concept of Design and implementation of Advanced Digital System Design.
3. Implementation of advanced digital circuits on FPGA boards.

PREREQUISITES

Basic Electronics and analysis and design of Digital Circuits.

List of Experiments

Verilog Program can be compile using any compiler, Verifying the functionality using suitable simulator. Down load the programs on FPGA boards and Verify the Functionality.

1	Write a Verilog description for the following combinational logic, Verify the design using Verilog test bench and perform the synthesis by downloading the design on to FPGA device. a. Structural modelling of Full adder using two half adders and or Gate b. BCD to Excess-3 code converter
2	Write a Verilog description for the following Sequential Circuits, Verify the design using Verilog test bench and perform the synthesis by downloading the design on to FPGA device. a. Mod-N counter b. Random sequence counter
3	Write a Verilog description for the following Sequential Circuits, Verify the design using Verilog test bench and perform the synthesis by downloading the design on to FPGA device. a. SISO and PISO shift register b. Ring counter
4	Write a Verilog description for the following Digital Circuits, Verify the functionality using Verilog test bench and perform the synthesis by downloading the design on to FPGA device. a. 4-Bit Ripple Carry Adder b. 4-Bit Linear Feedback shift register
5	Write a Verilog description for the following Digital Circuits, Verify the functionality using Verilog test bench and perform the synthesis by downloading the design on to FPGA device. a. 4-bit Array Multiplication b. 4-bit Booth Multiplication
6	Write a Verilog description to design a clock divider circuit that generates 1/2, 1/3rd and 1/4th clock from a given input clock. Port the design to FPGA and validate the functionality using output device.
7	Interface a Stepper motor to FPGA and Write a Verilog description to control Stepper motor rotation.
8	Interface a DAC to FPGA and Write a Verilog description to generate Square wave of frequency F KHz. Modify the code to down sample the frequency to F/2 KHz. Display the original and Down sampled signals by connecting them to an output device.
9	Write a Verilog description to convert an analog input of a sensor to digital form and to display

the same on a suitable display like set of simple LEDs like 7-Segment display digits.

PRESCRIBED TEXT BOOKS

Text Book #	Book Title	Authors	Edition	Publisher	Year
1	Verilog HDL: A Guide to Digital Design and Synthesis	Samir Palnitkar	2 nd Edition	Pearson Education	Reprint 2020

REFERENCE BOOKS

Reference Book #	Book Title	Authors	Edition	Publisher	Year
1	The Verilog hardware description Language	Donald E Thomas and Philip R Moorby,	5 th Edition	Springer Science Business Media	2008
2	Design through Verilog HDL	Padmanabhan and Tripura Sunadri,	1 st Edition	Wiley-IEEE Press	2003

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

Sl. #	Type of E-Resource	URL
1	MOOC's	<ul style="list-style-type: none"> Fundamentals of HDL (Lecture #008): https://www.youtube.com/watch?v=rdAPXzxeaxs&index=8&list=PLE3BC3EBC9CE15FB0

COURSE OUTCOMES:

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

CO #	Course Outcome Statement
CO1	Familiarize with the EDA tool to write HDL programs to understand simulation and synthesis of digital design.
CO2	Design, Simulation and Synthesis of Combinational circuits using EDA tool.
CO3	Design, Simulation and Synthesis of Sequential Circuits using EDA tool.
CO4	Interfacing DAC to FPGA device to generate different waveforms using Verilog HDL..
CO5	Interfacing Stepper motor to FPGA device to count the number of rotations of a stepper motor.

CO-PO-PSO Mapping

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

NATIONAL SERVICE SCHEME (NSS) – II

Course Code	B24NSKxxx	Total contact hours / week	2	CIE MARKS	100
Course Category	NCMC	Total SAAE hours/ semester	-	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	0			Exam Duration	-

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 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.(minimum 5 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:	
<p>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.</p> <p>2) At the end of every semester, activity report should be submitted for evaluation.</p>	

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.

SEMESTER 4 SYLLABUS (Academic Year: 2025-2026)

	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.
	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
C01	Understand the importance of his / her responsibilities towards society.
C02	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
C03	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
C04	Implement government or self-driven projects effectively in the field.
C05	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
C01	-	-	3	-	-	3	-	-	-	-	3	-	-	-
C02	-	-	3	-	-	3	-	-	-	-	3	-	-	-
C03	-	-	3	-	-	3	-	-	-	-	3	-	-	-
C04	-	-	3	-	-	3	-	-	-	-	3	-	-	-
C05	-	-	3	-	-	3	-	-	-	-	3	-	-	-
AVG	-	-	3	-	-	3	-	-	-	-	3	-	-	-

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
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.
	<ul style="list-style-type: none"> 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	

SEMESTER 4 SYLLABUS (Academic Year: 2025-2026)

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.

PHYSICAL EDUCATION (SPORTS & ATHLETICS) – II

Course Code	B24PEK410	Total contact hours / week	2	CIE MARKS	100
Course Category	NCMC	Total SAAE hours/ semester	-	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	0			Exam Duration	-

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	-	-	-
CO2	-	-	-	-	-	-	3	3	-	-	3	-	-	-
CO3	-	-	-	-	-	-	3	3	-	-	3	-	-	-
AVG	-	-	-	-	-	-	3	3	-	-	3	-	-	-

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

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 – II (Semester 4)

Course Code	B24YOK410	Total contact hours / week	2	CIE MARKS	100
Course Category	NCMC	Total SAAE hours/ semester	-	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	0			Exam Duration	-

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	

READY TO RISE

Course Code	B24SDC411	Total contact hours / week	2	CIE MARKS	100
Course Category	NCMC	Total SAAE hours/ semester	-	SEE MARKS	-
L:T:P:S	0:0:2:0	Total Notional Learning Hours	30	TOTAL MARKS	100
Total credits	0			Exam Duration	-

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>	15 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>	15 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