MANAKULA VINAYAGAR INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

Curriculum and Syllabus (First Year)

BACHELOR OF TECHNOLOGY (B.Tech.)

Electronics and Communication Engineering

(2025-26)

MANAKULA VINAYAGAR INSTITUTE OF TECHNOLOGY
Approved by AICTE, New Delhi and Affiliated to Pondicherry University
Accredited by NBA & NAAC 'A' Grade
Kalitheerthalkuppam, Puducherry - 605107

Accredited by

(An Autonomous Institution)

Curriculum & Syllabus

For

UG Degree Course

in

B.Tech

Electronics and Communication Engineering

R2025

2025-26

DEPARTMENT OF ECE
MANAKULA VINAYAGAR INSTITUTE OF TECHNOLOGY * PUDUCHERRY *

Dr. S. ARUNMOZHI, M.Tech., Ph.D.
Head of the Department
Dept. of Electronics & Communication Engine
Manakula Vinayagar Institute of Techno
Kalitheerthalkuppam, Puducherry - 605

2025-2026

(First Year Curriculum)

SEMESTER I							
S.No	**Course Code**	**CourseTitle**	**C**	**L**	**T**	**P**	**Credits**
Induction Programme for 3 weeks							
Theory							
1	25UMAT11	Matrices and Calculus	BS	3	1	0	4
2	25UPHT12	Physical science for Electronics Engineers	BS	3	0	0	3
3	25UECT13	Electron Devices	PC	3	0	0	3
Integrated course							
4	25UECI14	Basic Sensors and Instrumentation	ES	2	0	4	4
5	25UHSI16	Professional Communication for Engineers	HS	1	0	4	3
Practical							
6	25UPHP12	Physical science Laboratory	BS	0	0	2	1
7	25UECP12	Electronic Devices Laboratory	PC	0	0	2	1
8	25UGEP13	Engineering Graphics	ES	0	0	2	1
Employability Enhancement Course							
9	25UPCE11	Career Development skills	EEC	0	0	2	0
Mandatory Course							
10	25UMCC11	IKS – Concepts and applications in Engineering and Science	MCC	0	0	2	0
Total Credits							**20**

SEMESTER II							
S.No	**Course Code**	**Course Title**	**C**	**L**	**T**	**P**	**Credits**
Theory							
1	25UMAT22	Partial Differential Equations and Transforms	BS	3	1	0	4
2	25UHST22	Universal Human Values II	HS	2	0	0	2
3	25UECT23	Fundamentals of Electrical Machines	ES	3	0	0	3
4	25UECT24	Electric and magnetic circuits	PC	3	0	0	3
Integrated course							
5	25UCSI26	Programming in C	ES	2	0	2	3
6	25UECI26	Digital Electronics	PC	3	0	2	4
Practical							
7	25UECP21	Electric Machines Laboratory	ES	0	0	2	1
8	25UECP22	Electronics Fabrication lab	ES	0	0	2	1
Employability Enhancement Course							
9	25UPCE21	Communication skills	EEC	0	0	2	0
10	25UCCC21	Certification Course I	CCC	0	0	4	0
Mandatory Course							
11	25UMCC21	IKS in Humanities and Social Science	MCC	0	0	1	0
12	25UMCC22	Holistic wellness	MCC	0	0	2	0
Total Credits							**21**

SEMESTER III

S.No	Course Code	Course Title	C	L	T	P	Credits
Theory							
1	25UMAT31	Probability and statistics	BS	3	1	0	4
2	25UECT32	Signals and Systems	PC	2	1	0	3
3	25UECT33	Digital System Design	PC	2	1	0	3
4	25UECT34	Electronic Circuits	PC	3	0	0	3
Integrated course							
5	25UCSI35	Problem solving using Python	ES	3	0	2	4
Practical							
6	25UECP31	Digital System Design Lab	PC	0	0	2	1
7	25UECP32	Electronic Circuits Lab	PC	0	0	2	1
8	25UECP33	Design thinking Laboratory	PC	0	0	2	1
Employability Enhancement Course							
9	25UPCE31	Professional Development skills	EEC	0	0	2	0
Mandatory Course							
10	25UMCC31	Indian Constitution and Human Rights	MCC	1	0	0	0
						Total Credits	**20**

SEMESTER IV							
S.No	**Course Code**	**Course Title**	**C**	**L**	**T**	**P**	**Credits**
Theory							
1	25UMAT41	Linear Algebra for communication systems	BS	3	1	0	4
2	25UECT42	Microcontrollers	PC	2	1	0	3
3	25UECT43	Analog and Digital Communication	PC	3	0	0	3
4	25UECT44	Transmission Lines and Waveguides	PC	3	0	0	3
5	25UECT45	Nano and quantum Electronics	ES	3	0	0	3
Integrated course							
6	25UECI46	Linear Digital Control System	PC	2	1	2	4
Practical							
7	25UECP41	Microcontrollers Lab	PC	0	0	2	1
8	25UECP42	Analog and Digital Communication Lab	PC	0	0	2	1
9	25UECW41	Mini Project-1	CEC	0	0	2	2
Employability Enhancement Course							
10	25UPCE41	Professionalism and basic aptitude	EEC	0	0	2	0
11	25UCCC41	Certification Course II	CCC	0	0	4	0
Mandatory Course							
12	25UMCC41	SDG & Environmental Science	MCC	1	0	0	0
						Total Credits	**24**

SEMESTER V							
S.No	**Course Code**	**Course Title**	**C**	**L**	**T**	**P**	**Credits**

SEMESTER V							
S.No	**Course Code**	**Course Title**	**C**	**L**	**T**	**P**	**Credits**
Theory							
1	25UECT51	Computer Networks	PC	3	0	0	3
2	25UECT52	Information theory and Error corrections	PC	2	1	0	3
3	25UECT53	Antennas and RF	PC	2	1	0	3
4	25UECT54	Digital Signal Processing	PC	2	1	0	3
5	25UECLXX	Professional Elective-1	PE	3	0	0	3
Integrated course							
6	25UECI55	Linear Integrated Circuits	PC	2	1	2	4
Practical							
7	25UECP51	Embedded Systems Lab	PC	0	0	2	1
8	25UECP52	Digital Signal Processing Laboratory	PC	0	0	2	1
9	25UECP53	Computer communication Laboratory	PC	0	0	2	1
Employability Enhancement Course							
10	25UPEC51	Quantitative and verbal aptitude	EEC	0	0	2	0
Mandatory Course							
11	25UMCC51	Industrial Safety Engineering, and Disaster Management	MCC	1	0	0	0
Total Credits							**22**

SEMESTER VI							
S.No	**Course Code**	**Course Title**	**C**	**L**	**T**	**P**	**Credits**
Theory							
1	25UECT61	Embedded Systems	PC	2	1	0	3
2	25UHST62	Engineering Economics & Financial Management	HS	3	0	0	3
3	25UECT63	Wireless Communication	PC	3	0	0	3
4	25UECLXX	Professional Elective-2	PE	3	0	0	3
5	25UECOXX	Open Elective-1	OE	3	0	0	3
Integrated course							
6	25UECI64	VLSI Design	PC	3	0	2	4
Practical							
7	25UECW61	Mini Project-2	CEC	0	0	4	2
8	25UECP61	Wireless Communication Laboratory	PC	0	0	2	1
9	25UECP62	Embedded System Lab Laboratory	PC	0	0	2	1
Employability Enhancement Course							
10	25UPCE61	Analytical and reasoning skills	EEC	0	0	2	0
11	25UCCC61	Certification Course III	CCC	0	0	4	0
Mandatory course							
12	25UMCC61	Professional Ethics	HS	2	0	0	0
Total Credits							**23**

SEMESTER VII							
S.No	**Course Code**	**Course Title**	**C**	**L**	**T**	**P**	**Credits**
Theory							
1	25UHST71	Strategic Management for Engineers	HS	3	0	0	3
2	25UECT72	Microwave and Optical Engineering	PC	3	0	0	3
3	25UECLXX	Professional Elective3	PE	3	0	0	3
4	25UECLXX	Professional Elective-4	PE	3	0	0	3
Practical							
5	25UECP71	Microwave and Optical Engineering Lab	PC	0	0	2	1
6	25UECW71	Project Work Phase I	CEC	0	0	8	4
						Total Credits	**17**

SEMESTER VIII							
S.No	**Course Code**	**Course Title**	**C**	**L**	**T**	**P**	**Credits**
Theory							
1	25UECOXX	Open Elective-3	OE	3	0	0	3
2	25UECOXX	Open Elective -4	OE	3	0	0	3
Practical							
3	25UECW81	Project Work	CEC	0	0	16	8
		Internship					1
						Total Credits	**15**

Semester-wise Credit Distribution

Semester	Total Credits
I	20
II	21
III	20
IV	24
V	22
VI	23
VII	17
VIII	15
TOTAL	**162**

Category-wise Course Distribution and Statistics

Basic Science Courses (BS)

Course Name	Semester	Credits
Matrices & Calculus	I	4
Physical science for Electronics Engineers	I	3
Physical science Lab	I	1
Partial differential Equations and Transforms	II	4
Probability and statistics	III	4
Linear Algebra for communication systems	IV	4
Total BS Credits:		20

Humanities and Social Sciences (HS)

Course Name	Semester	Credits
Professional Communication for Engineers	I	3
Universal Human Values II	II	2
Engineering Economics & Financial Management	VI	3
Professional Ethics	VI	0
Strategic Management for Engineers	VII	3
Total HS Credits:		11

Engineering Science Courses (ES)

Course Name	Semester	Credits
Basic Sensors and Instrumentation	I	4
Engineering Graphics	I	1
Fundamentals of Electrical Machines	II	3
Problem solving using C	II	3
Electric Machines Laboratory	II	1
Fabrication lab	II	1
Problem solving using Python	III	4
Nano and quantum Electronics	IV	3
Total ES Credits:		20

Professional Core Courses (PC)

Course Name	Semester	Credits
Electron Devices	I	3
Electronic Devices Laboratory	I	1
Electric and magnetic circuits	II	3
Digital Electronics	II	4
Signals and Systems	III	3

Course Name	Semester	Credits
Digital System Design	III	3
Electronic Circuits	III	3
Digital System Design Lab	III	1
Electronic Circuits Lab	III	1
Design thinking Laboratory	III	1
Microcontrollers	IV	3
Analog and Digital Communication	IV	3
Transmission Lines and Waveguides	IV	3
Linear Digital Control System	IV	4
Microcontrollers Lab	IV	1
Analog and Digital Communication Lab	IV	1
Computer Networks	V	3
Information theory and Error corrections	V	3
Antennas and RF	V	3
Digital Signal Processing	V	3
Linear Integrated Circuits	V	4
Embedded Systems Lab	V	1
Digital Signal Processing Laboratory	V	1
Computer communication Laboratory	V	1
Embedded Systems	VI	3
Wireless Communication	VI	3
VLSI Design	VI	4
Wireless Communication Laboratory	VI	1
Embedded System Lab Laboratory	VI	1
Microwave and Optical Engineering	VII	3
Microwave and Optical Engineering Lab	VII	1
Total PC Credits:		72

Professional Elective Courses (PE)

Course Name	Semester	Credits
Professional Elective-1	V	3
Professional Elective-2	VI	3
Professional Elective-3	VII	3
Professional Elective-4	VII	3
Total PE Credits:		12

Open Elective Courses (OE)

Course Name	Semester	Credits
Open Elective-1	VI	3

Course Name	Semester	Credits
Open Elective-2	VIII	3
Open Elective-3	VIII	3
Total OE Credits:		9

Core Enrichment Courses (CEC)

Course Name	Semester	Credits
Mini Project-1	IV	2
Mini Project-2	VI	2
Project Work Phase I	VII	4
Project Work	VIII	8
Internship	VIII	1
Total CEC Credits:		17

Employability Enhancement Courses (EEC)

Course Name	Semester	Credits
Career Development skills	I	0
Communication skills	II	0
Professional Development skills	III	0
Professionalism and basic aptitude	IV	0
Quantitative and verbal aptitude	V	0
Analytical and reasoning skills	VI	0
Total EEC Credits:		0

Certification Courses (CCC)

Course Name	Semester	Credits
Certification Course I	II	0
Certification Course II	IV	0
Certification Course III	VI	0
Total CCC Credits:		0

Mandatory Courses (MCC)

Course Name	Semester	Credits
IKS – Concepts and applications in Engineering and Science	I	0
IKS in Humanities and Social Science	II	0
Holistic wellness	II	0
Indian Constitution and Human Rights	III	0
SDG & Environmental Science	IV	0
Industrial Safety Engineering, and Disaster Management	V	0
Total MCC Credits:		0

Summary of Total Credits by Category

Category	Total Credits	Percentage
Basic Science Courses (BS)	20	12.35%
Humanities and Social Sciences (HS)	11	6.79%
Engineering Science Courses (ES)	21	12.96%
Professional Core Courses (PC)	72	44.44%
Professional Elective Courses (PE)	12	7.41%
Open Elective Courses (OE)	9	5.56%
Core Enrichment Courses (CEC)	17	10.49%
Employability Enhancement Courses (EEC)	0	0.00%
Certification Courses (CCC)	0	0.00%
Mandatory Courses (MCC)	0	0.00%
TOTAL	**162**	**100.00%**

Syllabus
Semester I

25UMAT11	MATRICES and CALCULUS	Category	L	T	P	Credit
		BS	3	1	0	4

Course Prerequisite

- Higher Secondary Level Mathematics

Course Objective

- To understand and gain the knowledge of matrix algebra, partial differentiation, double integration, triple integration and their application, curl, divergence. To familiar with vector differential operators, integral theorems (Green's, Stoke's, Gauss divergence).

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Find eigenvalues and eigenvectors, verify the Cayley-Hamilton theorem, and perform orthogonal diagonalization.	Apply
CO2	Compute partial derivatives, determine total derivatives, Jacobians, employ Taylor's series, and find extremes of functions of two variables.	Apply
CO3	Demonstrate proficiency in evaluating double integration and triple integration and using them to compute area and volume.	Apply
CO4	Compute gradients, divergence, curl, directional derivatives, and apply vector identities to solve vector field problems.	Apply
CO5	Apply Green's theorem, Stoke's theorem and Gauss divergence theorem.	Apply

SYLLABUS

MODULE I MATRICES (12)

Eigenvalues and Eigen vectors of a real matrix, Characteristic equation, Properties of Eigen values and Eigenvectors- Cayley-Hamilton Theorem, Diagonalization of matrices. Reduction of a quadratic form to canonical form by orthogonal transformation -Nature of quadratic forms.

MODULE II FUNCTIONS OF SEVERAL VARIABLES (12)

Partial derivatives-Total derivative- Differentiation of implicit functions, Change of variables-Jacobians and their properties-Taylor's series for functions of two variables- Maxima and minima, Lagrange's method of undetermined multipliers.

MODULE III INTEGRAL CALCULUS (12)

Multiple Integral – Change of order of integration (Cartesian form). Applications: Areas as a double integral (Cartesian form) – Volume as a triple integral (Cartesian form).

MODULE IV VECTOR DIFFERENTIATION (12)

Scalar and vector valued functions-gradient, tangent plane – directional derivative-divergence and curl-scalar and vector potentials. Statement of vector identities-simple problems.

MODULE V VECTOR INTEGRATION (12)

Line, surface and volume integrals- statements of Green's, Stoke's and Gauss Divergence theorems – verification and evaluation of vector integrals using them.

TOTAL PERIODS: 60

TEXT BOOKS

1.Veerarajan T., "Engineering Mathematics – I and II", Tata McGraw-Hill, New Delhi, 2014 and 2015.
2.Dr. M.K. Venkataraman, "Engineering Mathematics – Volume I and Volume II", The National Publishing Company, Chennai 2008.

REFERENCE BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010.
3. Bali N.P and Manish Goyal., "A Text Book of Engineering Mathematics", Laxmi Publications(P) Ltd, 2011.
4. Erwin Kreyszig, Advanced Engineering Mathematics (9th Edition), John Wiley & Sons, New Delhi, 2011.

Web References :

1. https://nptel.ac.in/courses/111106100
2. https://nptel.ac.in/courses/111104125
3. https://nptel.ac.in/courses/111105121
4. https://nptel.ac.in/courses/111107112

CO-PO -PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	3	2	2	2									
CO2	3	2	2	2									
CO3	3	2	2	2									
CO4	3	2	2	2									
CO5	3	2	2	2									

Assessment Methodology	Assessment Tools	Marks
Test		25
Problem based Assignment	Moodle / Google form	5
Simulation (Python/Matlab/Scilab) Based Project assignment	Demo and viva	5
Attendance		5
Total		**40**

25UPHT12	PHYSICAL SCIENCE FOR ELECTRONICS ENGINEERS	Category	L	T	P	Credit
		BS	3	0	0	3

Course Prerequisite

- Higher Secondary Physics and Mathematics (Class XII level)
- Basic understanding of calculus and vector algebra

Course Objective

- This course provides first-year Electronics and Communication Engineering students with fundamental physics concepts essential for understanding electronic devices and systems.
- The course bridges theoretical physics with practical electronics applications, covering electromagnetic theory, quantum mechanics basics, solid-state physics, optoelectronics, and emerging battery technologies.

Students will develop a strong foundation in physical principles that govern electronic components, circuits, and modern energy storage systems.

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Apply solid-state physics concepts and materials properties	Apply
CO2	Apply quantum mechanical principles to explain the behavior of electrons in semiconductors and electronic devices	Apply
CO3	Understand light-matter interaction and apply to optoelectronic devices	Understand
CO4	Understand electrochemical principles and battery technologies and its applications in modern electronic systems	Understand
CO5	Understand photovoltaic principles and solar cell technologies and their integration in electronic and power systems	Understand

SYLLABUS

MODULE I SOLID STATE PHYSICS (9)

Crystal structures, lattice dynamics, band theory of solids, effective mass, density of states, Fermi-Dirac distribution, electrical and thermal conductivity.

MODULE II QUANTUM MECHANICS FOR ELECTRONICS (9)

Wave-particle duality, Schrödinger equation, quantum tunnelling, particle in a box, quantum wells, quantum dots, applications in electronic devices.

MODULE III: OPTOELECTRONICS AND PHOTONICS (9)

Light-matter interaction, absorption and emission processes, LEDs, laser diodes, photodetectors, optical fibers, photonic crystals.

MODULE IV: BATTERY TECHNOLOGY AND ENERGY STORAGE (9)

Electrochemical principles, battery types (Li-ion, solid-state, fuel cells), energy density and power density, charging mechanisms, battery management systems, emerging technologies.

MODULE V: SOLAR CELLS AND PHOTOVOLTAIC TECHNOLOGY (9)

Solar spectrum and photovoltaic effect, semiconductor band structure and photogeneration, types of solar cells: monocrystalline, polycrystalline, thin-film, emerging materials, fabrication basics and device physics, performance parameters: efficiency, fill factor, IV characteristics, applications: standalone and grid-connected systems, integration in electronics.

TEXT BOOKS

1. Resnick, Robert, David Halliday, and Kenneth S. Krane. Physics for Scientists and Engineers. 5th ed. Hoboken, NJ: Wiley, 2019.
2. Kittel, Charles. Introduction to Solid State Physics. 8th ed. Hoboken, NJ: Wiley, 2018.

REFERENCE BOOK

1. Charles Kittel, Introduction to Solid State Physics, 8th ed. (Hoboken, NJ: Wiley, 2018).
2. David J. Griffiths, Introduction to Quantum Mechanics, 2nd ed. (Upper Saddle River, NJ: Pearson Prentice Hall, 2004).
3. Bahaa E. A. Saleh and Malvin Carl Teich, Fundamentals of Photonics, 3rd ed. (Hoboken, NJ: Wiley, 2019).
4. David Linden and Thomas B. Reddy, Handbook of Batteries, 4th ed. (New York: McGraw-Hill, 2011).
5. Jenny Nelson, The Physics of Solar Cells, 1st ed. (London: Imperial College Press, 2003).
6. Martin A. Green, Third Generation Photovoltaics: Advanced Solar Energy Conversion, 1st ed. (Berlin: Springer, 2006).

WEB RESOURCES

1. Solid State Physics – TU Delft OCW: https://ocw.tudelft.nl/courses/solid-state-physics/
2. Lectures on Solid State Physics – David Tong (Cambridge): https://www.damtp.cam.ac.uk/user/tong/solidstate.html
3. Quantum Physics I – MIT OpenCourseWare: https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2013/
4. Quantum Mechanics for Everyone – GeorgetownX (edX): https://www.edx.org/course/quantum-mechanics-for-everyone
5. Fundamentals of Photonics – MIT OCW (related): https://ocw.mit.edu/courses/materials-science-and-engineering/3-60-symmetry-structure-and-tensor-properties-of-materials-spring-2005/

CO-PO -PSO Mapping

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

Assessment Methodology	Assessment Tools	Marks
Test		25
MCQ unit wise 10 questions	Moodle / Google form	5
Virtual lab based assignment	Demo and viva	5
Attendance		5
Total		**40**

25UECT13	ELECTRON DEVICES	Category	L	T	P	Credit
		PC	3	0	0	3

Course Prerequisite

- Higher Secondary Physics

Course Objective:

- To introduce components such as diodes, BJTs and FETs.
- To know the applications of devices.
- To know the switching characteristics of devices.

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy Level
CO1	Apply V-I characteristics to analyze diode behavior in different operating conditions.	Apply
CO2	Apply diode properties to design and analyze diode-based circuits for practical applications.	Apply
CO3	Apply the principle of operation of Bipolar Junction Transistors (BJT) to explain their functioning in electronic circuits.	Apply
CO4	Apply different biasing techniques to analyze BJT characteristics and determine operating points.	Apply
CO5	Apply the construction and operation principles of Field Effect Transistors (FET) to analyze their characteristics in various circuit configurations.	Apply

SYLLABUS

MODULE – I DIODES (9)

Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances, V-I Characteristics, Diode as a switch- switching times.

MODULE – II DIODE APPLICATIONS (9)

Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitiv e and Inductive Filters, Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

MODULE – III BIPOLAR JUNCTION TRANSISTOR (BJT) (9)

Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch, switching times.

MODULE – IV JUNCTION FIELD EFFECT TRANSISTOR (FET) (9)

Construction, Principle of Operation, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET, MOSTET as a capacitor**.**

MODULE – V SPECIAL PURPOSE DEVICES (9)

Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode.

TOTAL PERIODS: 45

TEXT BOOKS:

1. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. 11th ed. Pearson, 2013.
2. Floyd, Thomas L. Electronic Devices. 10th ed. Pearson, 2017.

REFERENCE BOOKS:

1. Millman, Jacob, and Christos C. Halkias. Integrated Electronics: Analog and Digital Circuits and Systems. McGraw-Hill, 1972.
2. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. 7th ed. Oxford University Press, 2014.
3. Razavi, Behzad. Fundamentals of Microelectronics. 2nd ed. Wiley, 2013.
4. Streetman, Ben G., and Sanjay Kumar Banerjee. Solid State Electronic Devices. 7th ed. Pearson, 2014.

Web Resources:

1. Electronic Devices and Circuits - MIT OCW: https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/
2. Semiconductor Device Fundamentals - Khan Academy: https://www.khanacademy.org/science/electrical-engineering
3. Electronic Devices Tutorial - All About Circuits: https://www.allaboutcircuits.com/textbook/semiconductors/
4. Diode and Transistor Circuits - Electronics Tutorials: https://www.electronics-tutorials.ws/

Mapping with Programme Outcomes

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

Assessment Methodology	Assessment Tools	Marks
Test		25
Application based Hobby circuits	Presentations	5
Simulation (TCAD, PSPICE, LT SPICE) Project based assignment	Demo and viva	5
Attendance		5
Total		**40**

25UECI14	BASIC SENSORS AND INSTRUMENTATION	Category	L	T	P	Credit
		ES	2	0	4	4

Course Prerequisite

- Higher Secondary Physics (Basic knowledge of electrical quantities (voltage, current, resistance)

Course Objective:

- To introduce first-year students to the fundamental concepts of sensors, transducers, and basic instrumentation systems.
- To provide hands-on experience with common sensors used in engineering applications.
- To develop basic skills in measurement techniques and data acquisition.
- Students will gain foundational knowledge of how physical quantities are measured and converted into electrical signals for further processing.

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy Level
CO1	Apply basic principles of sensors, transducers, and measurement systems.	Apply
CO2	Identify and classify different types of sensors based on their operating principles	Understand
CO3	Perform basic measurements using common sensors and display the results	Apply
CO4	Analyze sensor characteristics like accuracy, precision, and linearity	Aanlyze
CO5	Design simple sensor-based measurement circuits for practical applications	Create

SYLLABUS

MODULE I: INTRODUCTION TO MEASUREMENT SYSTEMS (8 Hours Theory + 8 Hours Lab)

Theory: Basic measurement concepts, units and standards, measurement errors and uncertainties, accuracy and precision, static and dynamic characteristics of instruments, measurement system components.

Lab Experiments:

Familiarization with basic measuring instruments
Error analysis and calibration techniques
Study of instrument specifications and datasheets

MODULE II: TEMPERATURE SENSORS (8 Hours Theory + 12 Hours Lab)

Theory: Temperature scales, thermal expansion principle, resistance temperature detectors (RTD), thermistors, thermocouples, IC temperature sensors, temperature measurement techniques.

Lab Experiments:

- Temperature measurement using thermistor
- Thermocouple characteristics and cold junction compensation
- LM35 IC temperature sensor interfacing
- Temperature monitoring system design

MODULE III: PRESSURE AND FORCE SENSORS (6 Hours Theory + 8 Hours Lab)

Theory: Pressure measurement principles, strain gauges, load cells, pressure transducers, piezoelectric sensors, applications in weight and force measurement.

Lab Experiments:

- Load cell calibration and measurement
- Strain gauge bridge circuits
- Pressure sensor interfacing and display

MODULE IV: DISPLACEMENT AND POSITION SENSORS (6 Hours Theory + 8 Hours Lab)

Theory: Linear and angular displacement measurement, potentiometric sensors, LVDT (Linear Variable Differential Transformer), encoders, proximity sensors, ultrasonic sensors.

Lab Experiments:

- LVDT characteristics study
- Ultrasonic distance measurement
- Proximity sensor applications
- Position measurement system

MODULE V: LIGHT AND OPTICAL SENSORS (8 Hours Theory + 8 Hours Lab)

Theory: Light measurement principles, photodiodes, phototransistors, LDR (Light Dependent Resistor), photoelectric sensors, fiber optic sensors, applications in automation.analog-to-digital conversion basics, digital displays, data logging principles

Lab Experiments:

- LDR characteristics and light measurement
- Photodiode and phototransistor interfacing
- Automatic street light control system
- Light intensity measurement and display
- Signal conditioning circuits for sensors
- Mini Project

TOTAL PERIODS: 60

TEXT BOOKS:

1. Doebelin, Ernest O. Measurement Systems: Application and Design. 5th ed. McGraw-Hill,

2003.
2. Morris, Alan S., and Reza Langari. Measurement and Instrumentation: Theory and Application. 2nd ed. Academic Press, 2015.

REFERENCE BOOKS:

1. Bentley, John P. Principles of Measurement Systems. 4th ed. Pearson, 2005.
2. Turner, James D., and Martin Hill. Instrumentation for Engineers and Scientists. Oxford University Press, 1999.
3. Patranabis, D. Sensors and Transducers. 2nd ed. PHI Learning, 2003.
4. Rangan, C.S., G.R. Sarma, and V.S.V. Mani. Instrumentation Devices and Systems. 3rd ed. McGraw Hill Education, 2014.

Web Resources:

1. Introduction to Sensors - National Instruments: https://www.ni.com/en-us/innovations/white-papers/06/introduction-to-sensors.html
2. Sensor Basics - Arduino: https://docs.arduino.cc/learn/electronics/sensors
3. Measurement and Instrumentation - MIT OCW: https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/
4. Sensors Tutorial - Electronics Tutorials: https://www.electronics-tutorials.ws/io/io_1.html
5. Basic Instrumentation - Khan Academy: https://www.khanacademy.org/science/physics

Mapping with Programme Outcomes

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

Assessment Methodology	Assessment Tools	Marks
Test		25
Real time based Sensor application – mini project	Hardware demo and report	5
Instrumentation simulation (LabVIEW/Multisim)	Demo and viva	5
Attendance		5
Total		**40**

25UHSI16	PROFESSIONAL COMMUNICATION FOR ENGINEERS	Category	L	T	P	Credit
		HS	1	0	4	3

Course Prerequisite:

- Basics of English Language

Course Objective:

- To improve the communicative competence of learners
- To learn to use basic grammatic structures in suitable contexts
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text
- To help learners use language effectively in professional contexts
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Use appropriate words in a professional context.	Understand
CO2	Gain understanding of basic grammatic structures and use them in right context.	Understand
CO3	Speak fluently and accurately in formal and informal communicative contexts	Understand
CO4	Write definitions, descriptions, narrations and essays on various topics	Understand
CO5	Express their opinions effectively in both oral and written medium of communication	Analyze

SYLLABUS

MODULE I: INTRODUCTION TO COMMUNICATION (9)

EFFECTIVE COMMUNICATION:(1)

What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C's of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

FUNDAMENTALS OF COMMUNICATION: (8)

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

LAB ACTIVITY: Extempore (Oral), Conversation on asking directions, Listening – Telephone conversation; Speaking Self-introduction; Telephone conversation – Video conferencing etiquette.

MODULE II: NARRATION AND SUMMATION (9)

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

LAB ACTIVITY: Listening – Travel podcast; Speaking – Narrating and sharing personal experiences through a podcast, Autobiography of a famous Personality

MODULE III: DESCRIPTION OF A PROCESS / PRODUCT (9)

Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

LAB ACTIVITY: Listening – Railway / Airport Announcements, Travel Vlogs; Speaking – Describing a place or picture description

MODULE IV: VISUALIZATION AND CLASSIFICATION (9)

Listening – TED talks Speaking – Interviewing a celebrity/Famous Personality Reading – Company profiles, Business Letters Vocabulary– Discourse Markers, Linking words and Phrases Collocation. Grammar – Pronouns, Conjunction, Preposition Writing – Interpretation of Charts and Graphs

LAB ACTIVITY: Picture Description, about purchasing a product, Summarizing a TED talk, Role play, Narrating an unforgettable event

UNIT V: EXPRESSION COMMUNICATION (9)

Listening – Watching Movies / Listening to Dialogues and Conversations Speaking – Role play, Panel Discussion, Debate Reading – Blogs, Novels, Short Stories Vocabulary – Phrasal Verbs Grammar– Simple/Compound/Complex Sentences, Error Spotting, Punctuation. Writing – Descriptive Essay, Dialogue Writing

LAB ACTIVITY: Listening /Reading Comprehension, Developing a story using given Vocabulary, Mini Presentation on General topic (ICT tools), Group Discussion

TOTAL PERIODS: 45

TEXTBOOKS

1. Raman, Meenakshi, and Sangeeta Sharma. Technical Communication: Principles and Practice. 3rd ed. New Delhi: Oxford University Press, 2015.
2. Kumar, Sanjay, and Pushp Lata. Communication Skills. 2nd ed. New Delhi: Oxford University Press, 2015.
3. Rizvi, M. Ashraf. Effective Technical Communication. 2nd ed. New Delhi: McGraw-Hill Education, 2017.

REFERENCE BOOK

1. Lakshmi Narayanan. A Course Book on Technical English. Chennai: Scitech Publications (India) Pvt. Ltd. 2012
2. Viswamohan, Aysha. English for Technical Communication (With CD). Ist ed. New Delhi: McGraw-Hill Education. ISBN: 0070264244.
3. Kumar, Kulbhusan, and R. S. Salaria. Effective Communication Skill. Ist ed. New Delhi: Khanna Publishing House.
4. Chellammal, V. Learning to Communicate. New Delhi: Allied Publishing House, 2003.

CO-PO -PSO Mapping

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
CO1	-	-	-	-	-	-	1	2	3		2
CO2	-	-	-	-	-	-	1	2	3		2
CO3	-	-	-	-	-	-	1	2	3		2
CO4	-	-	-	-	-	-	1	2	3		2
CO5	-	-	-	-	-	-	1	2	3		2

Assessment Methodology	**Assessment Tools**	**Marks**
Test		15
Listening and reading Comprehension	Online tool	5
Speaking assessment (Oral)	review	10
Online assessment test	Online tool	10
Content creation Competition	Peer review	5
Attendance		5
Total		**50**

25UPHP12	PHYSICAL SCIENCE LABORATORY	Category	L	T	P	Credit
		BS	0	0	2	1

Course Prerequisite

- Basic knowledge of elasticity, heat conduction, light properties is essential.

Course Objective

- To provide an experimental foundation for the theoretical concepts introduced in the lectures
- To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments
- To introduce the concepts and techniques which have a wide application in experimental science

Course Outcome

On the successful completion of the course, students will be able to.

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Apply the concepts of elasticity and beam bending to experimentally determine Young's modulus using the non-uniform bending setup and interpret the results to understand material stiffness.	Apply
CO2	Apply the principles of fluid mechanics to experimentally determine the viscosity of a given liquid using Poiseuille's method	Apply
CO3	Apply the concept of steady-state heat conduction to experimentally determine the thermal conductivity of a bad conductor using Lee's Disc apparatus	Apply
CO4	Apply the principles of wave optics and interference to experimentally determine the thickness of a thin spacer using the Air Wedge method, and interpret the fringe pattern to calculate precise measurements.	Apply
CO5	Apply the principles of laser diffraction and wave optics to experimentally determine the wavelength of a laser beam and calculate the particle size of a fine powder	Apply

SYLLABUS

1. Determination of Young‟s modulus of given material by non-uniform bending method.
2. Determination of viscosity of the given liquid using Poiseuille‟s method.
3. Determination of Thermal conductivity of a bad conductor –Lee‟s Discmethod
4. Determination of the thickness of a given thin material– Airwedgemethod
5. Determination of the wavelength of Laser and particle size of given powder
6. Determination of the angle of divergence of a laser beam using semiconductor
7. Determination of band gap of a semiconductor diode.
8. Determination of radius of curvature of lens Newtons ring method.
9. Determination of the spectrometer grating/ prism.
10. Determination of the optical fibber's numerical aperture and Acceptance angles.
11. Lattice structures and packing of spheres
12. Potentiometry - determination of redox potentials and emfs.

TEXT BOOKS

1. Melissinos, Adrian C., and Jim Napolitano. *Experiments in Modern Physics*. 2nd ed. Amsterdam: Academic Press, 2003.
2. Preston, Daryl W. *Experiments in Physics: A Laboratory Manual for Scientists and Engineers*. New York: John Wiley & Sons, 1985.

3. Srivastava, B. N., and R. C. Srivastava. *A Textbook of Practical Physics*. 11th ed. New Delhi: S. Chand & Company, 2014.

REFERENCE BOOKS

1. Millman, Samuel, ed. A Physicist's Desk Reference. 2nd ed. New York: American Institute of Physics, 1989.
2. Bevington, Philip R., and D. Keith Robinson. Data Reduction and Error Analysis for the Physical Sciences. 3rd ed. Boston: McGraw-Hill, 2003.
3. Born, Max, and Emil Wolf. Principles of Optics: Electromagnetic Theory of Propagation, Interference and Diffraction of Light. 7th ed. Cambridge: Cambridge University Press, 1999.
4. Chopra, K. L., and S. R. Das. Thin Film Solar Cells. New York: Plenum Press, 1983.
5. Senior, John M. Optical Fiber Communications: Principles and Practice. 3rd ed. Harlow: Prentice Hall, 2009.

Web Resources:

1. https://ocw.mit.edu/courses/physics/8-13-14-experimental-physics-i-ii-junior-lab/
   *Comprehensive experimental procedures and data analysis techniques*https://ocw.mit.edu
2. https://www.colorado.edu/physics/undergraduate/laboratory-courses
   *Detailed experimental setups and theoretical background*http://hyperphysics.phy-astr.gsu.edu
3. https://www.newport.com/n/optical-tutorials
   Optical measurement techniques and laser characterization methods

CO-PO -PSO Mapping

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

Assessment Methodology	Assessment Tools	Marks
Laboratory Conduction	Observation	10
Record work		10
Model exam		15
Viva		5
Virtual lab assignment	Review	5
STEM based model creation	Presentation	5
Attendance		10
Total		60

25UECP12	Electronic Devices Laboratory	Category	L	T	P	Credit
		PC	0	0	2	1

Course Prerequisite

- Basic knowledge of electrical circuits and Ohm's law
- Understanding of DC and AC quantities
- Familiarity with basic measuring instruments (multimeter, oscilloscope)

Course Objective

- To provide hands-on experience with semiconductor devices and their characteristics.
- To develop practical skills in analyzing and designing basic electronic circuits using diodes, BJTs, and FETs.
- To understand the behavior of electronic devices under different operating conditions through experimental verification.

Course Outcome

On the successful completion of the course, students will be able to.

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Apply V-I characteristics to analyze diode behavior in different operating conditions	Apply
CO2	Apply diode properties to design and analyze diode-based circuits for practical applications	Apply
CO3	Apply the principle of operation of Bipolar Junction Transistors (BJT) to explain their functioning in electronic circuits	Apply
CO4	Apply different biasing techniques to analyze BJT characteristics and determine operating points.	Apply
CO5	Apply the construction and operation principles of Field Effect Transistors (FET) to analyze their characteristics in various circuit configurations	Apply

SYLLABUS

1. To plot and analyze the forward and reverse bias V-I characteristics of PN junction diode and determine its parameters.
2. To study Zener diode characteristics in reverse bias and design a voltage regulator circuit.
3. To design and analyze half-wave and full-wave rectifier circuits and compare their performance parameters.
4. To plot input and output characteristics of BJT in common emitter configuration and determine its parameters.
5. To analyze different biasing techniques for BJT, determine Q-point, and compare their stability.
6. To study BJT as a small signal amplifier and measure voltage gain in common emitter configuration.
7. To demonstrate switching action of BJT and design practical switching circuits.
8. To plot drain and transfer characteristics of Junction Field Effect Transistor and determine its parameters.
9. To study the drain characteristics of Enhancement mode MOSFET and determine threshold voltage.
10. To design and test FET-based common source amplifier and measure its performance

parameters.

11. To compare the characteristics, parameters, and applications of diode, BJT, and FET devices.
12. To design and implement a practical electronic circuit using semiconductor devices and demonstrate integrated learning.

TEXT BOOKS

1. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. 11th ed. Pearson, 2013.
2. Floyd, Thomas L. Electronic Devices. 10th ed. Pearson, 2017.

Web Resources:

1. Electronic Devices and Circuits - MIT OCW: https://ocw.mit.edu/courses/6-012-microelectronic-devices-and-circuits-fall-2009/
2. Semiconductor Device Fundamentals - Khan Academy: https://www.khanacademy.org/science/electrical-engineering
3. Electronic Devices Tutorial - All About Circuits: https://www.allaboutcircuits.com/textbook/semiconductors/
4. Diode and Transistor Circuits - Electronics Tutorials: https://www.electronics-tutorials.ws/
5. NPTEL Electronic Devices: https://nptel.ac.in/courses/117/106/117106030/

CO-PO -PSO Mapping

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

Assessment Methodology	Assessment Tools	Marks
Laboratory Conduction	Observation	10
Record work		10
Model exam		15
Viva		5
Virtual lab assignment	Review	5
Circuit Construction Task	demo	5
Attendance		10
Total		60

25UGEP13	ENGINEERING GRAPHICS	Category	L	T	P	Credit
		ES	0	0	2	1

Course Prerequisite:

- Students should have a fundamental understanding of engineering mathematics and basic geometric concepts, including lines, angles, shapes, and spatial visualization skills, typically covered in secondary school education

Course Objective:

- To develop knowledge of standard practices in engineering drawing, including lettering, line work, dimensioning, and projection techniques.
- To enable students to construct and interpret conic sections, spirals, involutes, helix curves, and projections of points, lines, planes, and solids.
- To understand the development and intersection of surfaces like cylinder-cylinder and cylinder-cone, essential for fabrication and design.

Course outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Apply the principles of engineering drawing standards, including lettering, line types, dimensioning, and accurately construct conic sections, spirals, involutes, and helix curves.	Apply
CO2	Interpret and generate projections of solid objects and their sectional views, aiding in better understanding of internal features in engineering components.	Analyse
CO3	Develop the lateral surfaces of solids essential for manufacturing and fabrication processes.	Analyse
CO4	Create and interpret isometric and orthographic projections of engineering objects to effectively communicate design intent.	Analyse
CO5	Utilize computer-aided drafting tools, particularly AutoCAD, to produce accurate 2D engineering drawings of simple geometries, enhancing proficiency in modern engineering software.	Analyse

- To build skills in creating accurate isometric and orthographic projections for effective engineering communication.
- To introduce students to AutoCAD for creating 2D engineering drawings, enhancing their ability to use modern engineering tools..

LIST OF EXPERIMENTS

1: Introduction To Engineering Drawing Standards And Lettering
2: Line Work And Dimensioning Practice
3: Construction Of Conic Sections
4: Construction Of Involutes And Spirals
5: Construction Of Helix
6: Projection Of Points And Lines
7: Projection Of Planes
8: Projection Of Solids
9: Sections Of Solids
10: Development Of Surfaces
11: Isometric Projections
12: Conversion Of Pictorial To Orthographic Views
13: Introduction To Computer Graphics And AutoCAD
14: 2-D Diagrams Using AutoCAD Script

TEXTBOOKS

1. "Engineering Graphics with AutoCAD 2022" by Nighat Yasmin Ph.D. (Published October 11, 2021)
2. "Principles and Practices: An Integrated Approach to Engineering Graphics and AutoCAD 2024"

REFERENCES

1. N.D.Bhatt, Engineering Drawing,49thedition,Chorotar Publishing House,2006.
2. K.Venugopal, Engineering Drawing and Graphics+AutoCAD, 4th edition, NewAge International Publication Ltd.,2004.
3. DavidIcook and Robert NMc Dougal, Engineering Graphics and Design with computer applications, Holt – Sounders Int. Edn.1985.
4. James D Bethuneand et.al., Modern Drafting, Prentice Hall Int.,1989.

Web Resources

1. https://nptel.ac.in/courses/112/103/112103019/
2. https://archive.org/details/engineeringdrawingndbhatt

CO PO Mapping

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

Assessment Methodology	Assessment Tools	Marks
Laboratory Conduction	Observation	10

Record work		10
Model exam		15
Viva		5
Real Model Drawing	Review	5
CAD Simulation Test		5
Attendance		10
Total		60

25UPCE11	Career Development Skills	Category	L	T	P	Credit
		EEC	2	0	0	0

Prerequisite

Basic communication skills and foundational knowledge of workplace behavior.

Course Outcome

On the successful completion of the course, the students will be able to

CO No.	Course Outcomes
CO1	Help students assess themselves, explore career options, and set actionable goals through structured planning.
CO2	Develop motivation, enhance personality effectiveness, and instill discipline for personal and professional growth.
CO3	Build awareness and practice of grooming, hygiene, positive attitudes, manners, and professional behavior.
CO4	Strengthen self-awareness, time and stress management, and emotional intelligence for balanced personal development.
CO5	Introduce students to higher education paths, competitive exams, and the fundamentals of entrepreneurship and business planning.

Syllabus

UNIT 1 (10 Hours)

Career Planning: Introduction to Career Planning - Self-Assessment for Career Planning - Exploring Career Options - Developing a Career Plan

Goal Settings: Understanding Goal Setting - Setting Effective Goals - Action Plan Development - Practical Exercises

UNIT 2 (10 Hours)

Motivation – I: Definition and Importance of Motivation - Types of Motivation - Theories of Motivation - Factors Affecting Motivation

Personality Effectiveness: Components of Personality Effectiveness - Communication Skills - Interpersonal Skills - Practical Exercises

Building Personality and Discipline: Introduction to Personality Development - Building Positive Habits - Discipline and Self-Control - Practical Application

UNIT 3 (10 Hours)

Grooming, Hygiene and Cleanliness: Personal Hygiene Practices - Body Grooming Techniques - Environmental Cleanliness - Mental and Social Impact of Grooming and Hygiene

Attitudes, Manners and Behaviour: Understanding Attitudes - Developing Positive Attitudes - Manners and Etiquette - Procedures and Protocols

UNIT 4 (10 Hours)

Self-Awareness & Self Confidence: Introduction to Self-Awareness - Understanding Strengths and Weaknesses - Building Self-Confidence - Practical Application

Time Management: Introduction to Time Management - Planning and Prioritizing Tasks - Overcoming Procrastination - Practical Time Management

Stress Management: Understanding Stress - Stress Management Techniques - Coping Strategies - Practical Application

Emotional Intelligence: Introduction to Emotional Intelligence - Managing Emotions - Social Awareness and Relationship Management - Practical Exercises

UNIT 5 (8 Hours)

Introduction to Higher Education, Competitive Exams: Overview of Higher Education - Competitive Exams Overview - Exam Preparation Techniques

Introduction to Entrepreneurship: Understanding Entrepreneurship - Developing a Business Idea - Business Planning

Text Books

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education

Reference Books

1. The Emotionally Intelligent Workplace by DANIEL GOLEMAN
2. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI
3. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
4. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1							2	2	2		2
CO2							2	2	2		2
CO3							2	2	2		2
CO4							2	2	2		2
CO5							2	2	2		2

Assessment Methodology	**Assessment Tools**	**Marks**
Career Development Portfolio	Assignment	20
Personality Development Assignment	Assignment	20
Goal Setting and Action Plan Project	Project	15
Grooming and Etiquette Demonstration	Practical/Demo	15
Time and Stress Management Project	Project	20

Assessment Methodology	Assessment Tools	Marks
Attendance and Class Participation	Continuous Assessment	10
Total		**100**

25UMCC11 - IKS Concepts and Applications in Engineering and

		Category	L	T	P	Credit
25UMCC11	**IKS – CONCEPTS AND APPLICATIONS IN ENGINEERING AND SCIENCE**	MCC	0	0	2	0

Course Prerequisite

Basic understanding of science and engineering fundamentals

Course Objective

This course introduces students to the rich heritage of Indian Knowledge Systems (IKS) and their contemporary applications in engineering and science. The objective is to:

- Familiarize students with traditional Indian knowledge systems and their scientific foundations
- Explore the integration of ancient wisdom with modern engineering practices
- Understand sustainable technologies and innovations rooted in Indian traditions
- Develop appreciation for indigenous knowledge in solving contemporary challenges

Foster research mindset towards validating and modernizing traditional practices

Course Outcome

On the successful completion of the course, students will be able to:

CO1	Understand the historical development and scientific basis of Indian Knowledge Systems
CO2	Analyze traditional Indian practices in mathematics, astronomy, metallurgy, and medicine
CO3	Apply IKS principles to contemporary engineering and scientific problems
CO4	Evaluate the sustainability aspects of traditional Indian technologies
CO5	Create innovative solutions by integrating traditional knowledge with modern science

Syllabus

UNIT I: Introduction to Indian Knowledge Systems (6 Hours) –

Historical overview of Indian Knowledge Systems - Scientific methodology in ancient India - Major texts and scholars: Vedas, Upanishads, Charaka Samhita, Sushruta Samhita - Transmission and preservation of knowledge - Contemporary relevance and global recognition.

UNIT II: Mathematics and Astronomy in Ancient India (6 Hours) –

Indian contributions to mathematics: Zero, decimal system, trigonometry - Aryabhata, Brahmagupta, Bhaskara's contributions - Astronomical observations and calendar systems - Navigation techniques and geographical knowledge - Applications in modern engineering calculations.

UNIT III: Metallurgy, Materials, and Architecture (6 Hours) - Ancient Indian metallurgy: Iron pillar of Delhi, Wootz steel - Traditional building materials and techniques - Architectural marvels: Structural engineering principles - Water harvesting and management systems - Sustainable construction practices.

UNIT IV: Medicine, Agriculture, and Life Sciences (6 Hours) - Ayurveda: Principles and scientific validation - Traditional agricultural practices and crop management - Biodiversity conservation methods - Food preservation techniques - Biotechnology applications in traditional practices.

UNIT V: Integration with Modern Science and Technology (6 Hours) - Validating traditional knowledge through modern scientific methods - Case studies of successful IKS-modern science integration - Intellectual property and traditional knowledge protection - Research opportunities and career prospects - Future directions and challenges

Text Book

1. Subhash Kak, “The Nature of Physical Reality”, Mount Meru Publishing, 2016

   B.V. Subbarayappa, “Indian Astronomy: A Source Book”, Nehru Centre, 2008

2. Kapila Vatsyayan, “Traditional Indian Art and Culture”, Cambridge University Press, 2015

Reference Book & Web Resources

1. P.P. Divakaran, “The Mathematics of India: Concepts, Methods, Connections”, Springer, 2018
2. S.N. Sen, “Ancient Indian History and Civilization”, New Age International, 2010
   National Mission for Manuscripts - www.namami.gov.in
3. Digital Library of Traditional Ecological Knowledge - www.frlht.org
4. CSIR Traditional Knowledge Digital Library - www.tkdl.res.in

Mapping with Programme Outcomes

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

Assessment Methodology	Assessment Tools	Marks
Major IKS Integration Project	Project	20
Traditional Knowledge Practical Demonstration	Practical/Demo	20
Scientific Validation Assignment	Assignment	15
Heritage Site/Museum Field Report	Field Work	15
Innovation Proposal Presentation	Presentation	20
Attendance and Lab Participation	Continuous Assessment	10
Total		**100**

Syllabus
Semester II

25UMAT22	Partial Differential Equations and Transforms	Category	L	T	P	Credit
		BS	3	1	0	4

Course Objective

- To introduce mathematical tools to solve first order differentiation equations.
- To gain knowledge of problem-solving techniques of PDE.
- To understand concept of the Laplace transform.
- To inculcate the computation knowledge in Laplace transforms.
- To acquaint with Fourier Transform techniques used in a wide variety of situations involving functions that are not necessarily periodic.

Course Prerequisite: Mathematics-I

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Solve higher order differential equations	Apply
CO2	Formulate and solve various types of partial differential equations	Apply
CO3	Apply Laplace transforms and initial and final value theorems to solve engineering problems involving step, impulse and periodic functions.	Apply
CO4	Apply Fourier series for periodic functions and find its components with knowledge of properties	Apply
CO5	Apply Fourier transform techniques, including Fourier integral theorem, properties of Fourier transforms, convolution, and Parseval's identity	Apply

Syllabus

MODULE I ORDINARY DIFFERENTIAL EQUATIONS 12

Differential Equations (Higher order): Linear differential equations of higher order – with constant coefficients, the operator D, Euler 's linear equation of higher order with variable coefficients - simultaneous linear differential equations, solution by variation of parameters method.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS 12

Formation of partial differential equations- Solutions of standard types of first order partial differential equations- Lagrange's linear equation- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT III LAPLACE TRANSFORM 12

Existence conditions-Transforms of elementary functions- Properties, Transform of unit step function and unit impulse function -Transforms of derivatives and integrals- Transforms of Periodic Functions- Initial and final value theorems. Inverse Laplace Transforms. Inverse Laplace transforms using Partial fraction methods and properties.

UNIT IV FOURIER SERIES 12

Fourier Series solutions for Periodic functions and simple waveforms. Properties of Fourier

Series and Dirichlet conditions.

UNIT V FOURIER TRANSFORM 12

Fourier Integral theorem (statement only), Fourier transform and its inverse – Properties, Fourier sine and cosine transform - Properties, Convolution and Parseval's identity.

TOTAL PERIODS: 60

Text Book

1.Veerarajan T., "Engineering Mathematics – I and II",Tata McGraw-Hill, New Delhi, 2014 and 2015.

2.Dr. M.K. Venkataraman, "Engineering Mathematics – Volume I and Volume II", The National Publishing Company, Chennai 2008.

Reference Book & Web Resources

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2015.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, 2010.
3. Bali N.P and Manish Goyal., "A Text Book of Engineering Mathematics", Laxmi Publications(P) Ltd, 2011.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New Delhi, 9th Edition, 2011.

Online Courses/NPTEL/SWAYAM:

1. https://nptel.ac.in/courses/111106139
2. https://nptel.ac.in/courses/111101153
3. https://nptel.ac.in/courses/111107119

Mapping with Programme Outcomes

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

Assessment Methodology	Assessment Tools	Marks
Test		25
Mathematical modeling assignment	Analytical solution presentation	5
Transform applications project (MATLAB/Python)	Demo and viva	5
Attendance		5
Total		**40**

25UHST22	UNIVERSAL HUMAN VALUES-II	Category	L	T	P	Credit

		HS	2	0	0	2

Course Objective

- To enable students to grasp the relevance of value-based living for personal and societal well-being.
- To help students identify the components of human existence and differentiate their individual needs.
- To promote an understanding of key human values that foster harmonious relationships.
- To develop an awareness of the symbiotic relationship between humans and nature
- To encourage ethical and humanistic behavior, particularly in professional and social contexts.

Course Outcome

On the successful completion of the course, students will be able to

CO. No.	Course Outcomes	Blooms Taxonomy level
CO1	Understand the importance of value education in achieving happiness, prosperity, and holistic human development.	Understand
CO2	Distinguish between the needs of the self and the body to ensure inner harmony and well-being.	Understand
CO3	Illustrate trust, respect and justice in the family and society build harmony in human relationships.	Understand
CO4	Recognize the interconnectedness and mutual fulfillment among all orders of nature to live in harmony with existence.	Remember
CO5	Describe the importance of ethical conduct based on natural acceptance of human values.re	Understand

SYLLABUS

MODULE I – INTRODUCTION TO VALUE EDUCATION (9)

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 Fulfill the Basic Human Aspirations: Exploring Natural Acceptance.

MODULE II – HARMONY IN THE HUMAN BEING (9)

Understanding Human being as the Co-existence of the Self and the Body; Distinguishing between the Needs of the Self and the Body; Exploring the difference of Needs of Self and Body; The Body as an Instrument of the Self; Understanding Harmony in the Self ; Harmony of the Self with the Body ; Programme to ensure self-regulation and Health; Exploring Harmony of Self with the Body.

MODULE III – HARMONY IN THE FAMILY AND SOCIETY (9)

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.

MODULE IV – HARMONY IN THE NATURE/EXISTENCE (9)

Understanding Harmony in the Nature; Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature: - Exploring the Four Orders of Nature; Realizing Existence as Co-existence at All Levels; The Holistic Perception of Harmony in Existence: - Exploring Co-existence in Existence.

MODULE V – IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS (9)

Natural Acceptance of Human Values; Definitiveness of (Ethical) Human Conduct: - Exploring Ethical Human Conduct; A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order; Competence in Professional Ethics:- Exploring Humanistic Models in Education; Holistic Technologies, Production Systems and Management Models-Typical Case Studies; Strategies for Transition towards Value-based Life and Profession.

TOTALPERIODS:45

TEXT BOOK AND TEACHERS' MANUAL

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethic", Excel Books, 2nd Revised Edition, New Delhi, 2019.
2. RR Gaur, R Asthana, G P Bagaria, "Teachers‟ Manual for A Foundation Course in Human Values and Professional Ethics", Excel Books, 2nd Revised Edition New Delhi, 2019.

REFERENCE BOOKS:

1. Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak," Jeevan Vidya" 1999.
2. A.N. Tripathi, "Human Values" New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth".

Web Resources:

1.https://nptel.ac.in/courses/109/104/109104115/
2. https://www.ugc.ac.in/pdfnews/8504234_Value-Education.pdf
3. https://www.aicte-india.org/sites/default/files/UHV%20Model%20Curriculum.pdf
4. http://www.rguktn.ac.in/value-education

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						3		3					
CO2						3	3	3			3		
CO3						3		3	3				
CO4						3	3	3		3			
CO5											3		

Assessment Methodology	Assessment Tools	Marks
Test		25
Case study analysis	Group discussion and report	5
Value-based project proposal	Presentation and peer evaluation	5
Attendance		5

Assessment Methodology	Assessment Tools	Marks
Total		**40**

25UECT23	FUNDAMENTALS OF ELECTRICAL MACHINES	Category	L	T	P	Credit
		ES	3	0	0	3

Course Prerequisite

- Higher Secondary Physics

Course Objective

- To introduce the principles of operations of DC machines as motor and generator
- To introduce the principles of operations of Transformers
- To introduce the principles of operations of Induction machines
- To introduce the principles of operations of Synchronous machines

To introduce other special machines

Course Outcome

On the successful completion of the course, students will be able to.

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Analyze the principle of operation, construction, and characteristics of DC motors and generators, and apply methods for starting, speed control, and braking.	Analyze
CO2	Apply transformer principles, construct equivalent circuits, calculate efficiency and regulation, and analyze three-phase transformer connections.	Apply
CO3	Apply synchronous machine operation, derive EMF equations, analyze phasor diagrams, and evaluate motor starting methods and V-curve characteristics.	Apply
CO4	Analyze induction motor principles, interpret torque-slip characteristics, and design starting methods and speed control techniques.	Analyze
CO5	Analyze single-phase motors, special machines, and modern motor technologies including their operating principles and applications.	Analyze

SYLLABUS

MODULE I D.C. MACHINES (9)

D.C. Machines – Principle of operation and construction of motor and generator – torque and EMF equation – Various excitation schemes – Characteristics of Motor and Generator – Starting, Speed control and braking of D.C. Motor

MODULE II TRANSFORMERS (9)

Principle, Construction and Types of Transformers - EMF equation - Equivalent circuits – Phasor diagrams - Regulation and efficiency of a transformer-three phase transformer Connection.

MODULE III SYNCHRONOUS MACHINES (9)

Principle of Operation, type - EMF Equation and Phasor diagrams - Synchronous motor-Rotating Magnetic field Starting Methods, Torque V-Curves, inverted – V curves

MODULE IV THREE PHASE INDUCTION MOTORS (9)

Induction motor-principle of operation, Types - Torque-slip characteristics - Starting methods and Speed control of induction motors.

MODULE V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES (9)

Types of single-phase induction motors –Double field revolving theory- Capacitor start capacitor run motors – Shaded pole motor – Repulsion type motor – Universal motor – Hysteresis motor -Permanent magnet synchronous motor – Switched reluctance motor – Brushless D.C motor.

TEXT BOOKS

1. B.S.Guru and H.R. Hiziroglu, "Electric Machinery and Transformer', Oxford university Press 2007.
2. M.N. Bandyopadhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2009.
3. Deshpande M. V., "Electrical Machines" PHI Learning Pvt. Ltd., New Delhi, 2011.

REFERENCE BOOK

1. Del Toro, V., "Electrical Engineering Fundamentals", Prentice Hall of India, New Delhi,1995.
2. Fitzgerald A.E, Kingsley C., Umans, S. and Umans S.D., "Electric Machinery", McGraw- Hill, Singapore, 2000.
3. Nagrath I. J and Kothari D. P. 'Electric Machines', Fourth Edition, Tata McGraw Hill Publishing Company Ltd, 2010.
4. M.S. Sarma and M.K. Pathak, "Electric Machines", Cengage Learning, 2012.
5. C.A. Gross, "Electric Machines", CRC Press 2010.

WEB RESOURCES

1. MIT Open Course Ware - Electric Machines URL:https://ocw.mit.edu/courses/6-685-electric-machines-fall-2013/
2. NPTEL (National Programme on Technology Enhanced Learning) URL:https://nptel.ac.in/courses/108/105/108105046/

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

Assessment Methodology	Assessment Tools	Marks
Test		25
Machine design calculations	Problem-solving assignment	5
Simulation analysis (ANSYS Maxwell/MATLAB/Virtual lab)	Demo and report	5
Attendance		5
Total		**40**

25UECT24	ELECTRIC AND MAGNETIC CIRCUITS	Category	L	T	P	Credit
		PC	2	1	0	3

Course Prerequisite

- Higher Secondary Physics and Mathematics

Course Objective

- To understand the fundamental concepts of electric and magnetic circuits, analyze DC and AC circuits using various methods and theorems, and explore the behavior of magnetic and coupled circuits including transformers.

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Apply circuit laws and theorems to analyze DC circuits.	Apply
CO2	Analyze steady-state sinusoidal AC circuits using phasor techniques.	Analyze
CO3	Examine the transient behavior of electrical circuits and three-phase power systems	Analyze
CO4	Understand the principles of magnetic circuits and electromagnetic induction.	Understand
CO5	Analyze coupled circuits and transformer operation using equivalent circuit models.	Analyze

SYLLABUS

MODULE I BASIC CONCEPTS OF ELECTRIC CIRCUITS (9)

Ohm's Law, Kirchhoff's Laws (KVL and KCL), Series and Parallel Circuits, Node and Mesh Analysis, Source Transformation, Superposition Theorem, Thevenin's and Norton's Theorems, Maximum Power Transfer Theorem, Star-Delta and Delta-Star Transformation

MODULE II ALTERNATING CURRENT (AC) CIRCUITS (9)

Sinusoidal Waveforms and Phasor Representation, Impedance and Admittance Concepts, AC Circuit Analysis (RLC in series and parallel), Power in AC Circuits: Real, Reactive, Apparent Power and Power Factor, Resonance in Series and Parallel Circuits, Quality Factor and Bandwidth

MODULE III TRANSIENT ANALYSIS AND THREE-PHASE CIRCUITS (9)

Transient Response of RL, RC, and RLC Circuits using Laplace Transform, Initial and Final Value Theorems, Three-Phase Systems: Star and Delta Connections, Line and Phase Quantities, Power Measurement in Three-Phase Circuits (Two Wattmeter Method)

MODULE IV MAGNETIC CIRCUITS AND ELECTROMAGNETIC INDUCTION (9)

Magnetic Field **Concepts**: MMF, Flux, Reluctance, Permeability, Comparison of Electric and Magnetic Circuits, Series and Parallel Magnetic Circuits, Hysteresis and Eddy Current Losses, Faraday's Laws, Lenz's Law, Self and Mutual Inductance, Coefficient of Coupling

MODULE V COUPLED CIRCUITS AND TRANSFORMERS (9)

Dot Convention and Polarity in Coupled Circuits, Equivalent Circuits and Analysis of Coupled Coils, Energy Stored in Magnetic Fields, Basics of Transformers: Ideal and Practical Transformer, Equivalent Circuit, Phasor Diagram, Losses, Efficiency, Auto Transformers and Applications

TEXT BOOKS

1. Alexander, Charles K., and Matthew N. O. Sadiku. Fundamentals of Electric Circuits. 7th

ed. New York: McGraw-Hill Education, 2021.
2. Nilsson, James W., and Susan A. Riedel. Electric Circuits. 11th ed. Boston: Pearson, 2019.
3. Hayt, William H., Jack E. Kemmerly, and Steven M. Durbin. Engineering Circuit Analysis. 9th ed. New York: McGraw-Hill Education, 2019.

REFERENCE BOOKS

1. Dorf, Richard C., and James A. Svoboda. Introduction to Electric Circuits. 9th ed. Hoboken: John Wiley & Sons, 2014.
2. Boylestad, Robert L. Introductory Circuit Analysis. 13th ed. Boston: Pearson, 2016.
3. Thomas, Roland E., Albert J. Rosa, and Gregory J. Toussaint. The Analysis and Design of Linear Circuits. 8th ed. Hoboken: John Wiley & Sons, 2016.
4. Irwin, J. David, and R. Mark Nelms. Basic Engineering Circuit Analysis. 11th ed. Hoboken: John Wiley & Sons, 2015.

WEB REFERENCES

1. CircuitLab - Online Circuit Simulator, https://www.circuitlab.com/*Interactive circuit simulation for DC, AC, and transient analysis*
2. MIT OpenCourseWare - Circuits and Electronics, https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/*Comprehensive lecture notes and problem sets on circuit fundamentals*

Mapping with Programme Outcomes

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

Assessment Methodology	Assessment Tools	Marks
Test		25
Circuit analysis problems	Weekly problem sets	5
Troubling Exercise	Competition	5
Attendance		5
Total		**40**

25UCSI26	PROGRAMMING IN C	Category	L	T	P	Credit
		ES	2	0	2	3

Course Objective

- To impart comprehensive knowledge of C programming through an integrated approach combining theoretical foundations with hands-on practical implementation, covering basic programming constructs, arrays, strings, functions, structures, pointers, and file handling..

Course Outcomes:

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	Apply Basic syntax of C Programming and develop simple program in C using basic constructs.	Apply
CO2	Apply arrays and string operations to solve computational problems	Apply
CO3	Develop modular programs using functions, recursion, and pointers	Apply
CO4	Implement user-defined data types using structures and unions with dynamic memory management	Apply
CO5	Implement file operations and utilize preprocessor directives effectively.	Apply

Syllabus

MODULE I INTRODUCTION TO PROGRAMMING PARADIGMS: (3 hours)

Introduction to programming paradigms – Applications of C Language – Structure of C program – C programming: Data Types – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions – Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Preprocessor directives – Compilation process.

Laboratory (6 hours):

- Study of compilation and execution of simple C programs
- Simple computational problems using arithmetic expressions
  - Arithmetic operations
  - Area and circumference of a circle
  - Temperature conversions

MODULE II DECISION MAKING, ARRAYS AND STRINGS (3 hours)

Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.

Laboratory (6 hours):

- Problems involving if-then-else structures
  - ODD/EVEN number identification
  - Finding greatest among numbers
- Iterative problems and loop implementations
  - Sum of series, factorial calculation
  - Sum of digits, pattern printing
- Array operations and string manipulation
  - Matrix operations (addition, subtraction)

- String handling functions and palindrome checking

MODULE III FUNCTIONS AND POINTERS (3 hours)

Modular programming – Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions – Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.

Laboratory (6 hours):

- Simple function implementations
  - nCr calculation
  - Swapping using call-by-value and call-by-reference
- Recursive function programming
  - Factorial using recursion
  - Binary search implementation
- Pointer operations
  - Pointers to arrays and strings
  - Array of pointers implementation

MODULEIV STRUCTURES AND UNION (3 hours)

Structure – Nested structures – Pointer and Structures – Array of structures – Self-referential structures – Dynamic memory allocation – Singly linked list – typedef – Union – Storage classes and Visibility.

Laboratory (6 hours):

- Structure implementations
  - Student record management
  - Nested structures for complex data
- Dynamic memory allocation
  - malloc, calloc, realloc implementations
  - Simple linked list operations

MODULE V FILE MANAGEMENT AND MEMORY ALLOCATION:(3 hours)

Files- Types of file processing, I/O Operations of File, Random access file, Command line arguments. Dynamic memory allocation- Linked list, types, Preprocessor directive, Macro substitution, Compiler control directive.

Laboratory (6 hours):

- File operations
  - Reading and writing text files
  - Binary file operations
  - Random access implementations
- Comprehensive programming exercises
  - Mini-project combining multiple concepts

TEXTBOOKS:

1. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016.
2. E. Balagurusamy, “Programming in C” McGraw-Hill, 8th Edition, 2019.
   Kernighan, B.W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.

REFERENCE BOOKS:

1.Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", 8th edition, Pearson Education, 2018.

2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.

3.Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", 2nd Edition, Oxford University Press, 2013.

4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.

ONLINE/ NPTEL COURSES:

1. C for Everyone: Programming Fundamentals- https://www.coursera.org/learn/c-for-everyone
2. Art of C programming -https://onlinecourses.swayam2.ac.in/cec24_cs05/preview
3. Introduction to Programming in C.- https://onlinecourses.nptel.ac.in/noc22_cs40/preview

CO-PO Mapping

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2		2						1
CO2	3	2	3		2						1
CO3	3	2	3		2						1
CO4	3	2	3		3						1
CO5	3	2	3		3						1

Assessment Methodology	Assessment Tools	Marks
Theory Test		15
Coding assignments	Online submission	10
Mini project implementation	Code demo and documentation	10
Model Practical		10
Attendance		5
Total		50

25UPCI26	**Digital Electronics**	**Category**	**L**	**T**	**P**	**Credit**
		PC	3	0	2	4

Course Prerequisite

- Higher Secondary Physics and Mathematics (Class XII level)

Course Objective

- To impart fundamental knowledge of digital electronics including number systems, Boolean algebra, and logic gates, establishing a strong theoretical foundation for digital circuit design.
- To develop analytical and design skills for creating combinational and sequential logic circuits using systematic design procedures and minimization techniques.
- To enable students to implement and test digital circuits through hands-on laboratory experiments using standard ICs and modern simulation tools.
- To prepare students for advanced courses in microprocessors, computer architecture, and embedded systems by providing essential digital logic concepts and practical skills.

Course Outcome

On the successful completion of the course, students will be able to

CO No.	**Course Outcomes**	**Blooms Taxonomy level**
CO1	Convert between number systems and apply binary arithmetic operations with practical verification	Apply
CO2	Analyze and simplify Boolean expressions using Boolean algebra theorems and Karnaugh maps	Analyze
CO3	Design and build combinational logic circuits for real-world applications	Create
CO4	Construct and test sequential circuits including flip-flops and counters	Create
CO5	Troubleshoot and debug digital circuits using test equipment and simulation tools	Evaluate

SYLLABUS

MODULE I NUMBER SYSTEMS AND DIGITAL CODES (6)

Binary, octal, decimal and hexadecimal number systems, number system conversions, binary arithmetic operations, 1's complement and 2's complement representation, signed and unsigned numbers, BCD code, Gray code, ASCII code, Excess-3 code, error detection using parity bit, digital signal characteristics.

MODULE II BOOLEAN ALGEBRA AND LOGIC GATES (6)

Basic logic gates (AND, OR, NOT), universal gates (NAND, NOR), exclusive gates (XOR, XNOR), truth tables and timing diagrams, Boolean postulates and theorems, De Morgan's theorems, simplification of Boolean expressions, standard forms (SOP and POS), canonical forms (minterms and maxterms), duality principle.

MODULE III MINIMIZATION TECHNIQUES (6)

Karnaugh maps for 2, 3 and 4 variables, don't care conditions, Quine-McCluskey method.

MODULE IV COMBINATIONAL CIRCUITS (6)

Implementation using NAND and NOR gates, half adder, full adder, half subtractor, full subtractor, parallel binary adder. Multiplexers (2:1, 4:1, 8:1), demultiplexers, encoders and decoders (2×4, 3×8), BCD to 7-segment decoder,

MODULE V SEQUENTIAL LOGIC CIRCUITS (6)

Difference between combinational and sequential circuits, SR latch using NAND and NOR gates, gated SR latch, D flip-flop, JK flip-flop, T flip-flop, master-slave configuration.

List of Experiments:

Experiment 1: Verification of Logic Gates

To verify the truth tables of basic logic gates (AND, OR, NOT), universal gates (NAND, NOR), and exclusive gates (XOR, XNOR) using 7400 series ICs.

Experiment 2: Boolean Theorem Verification

To implement and verify De Morgan's theorems and other Boolean identities using logic gate ICs.

Experiment 3: Half Adder and Full Adder

To design and implement half adder and full adder circuits and verify their sum and carry outputs.

Experiment 4: Half Subtractor and Full Subtractor

To design and implement half subtractor and full subtractor circuits and demonstrate binary subtraction with borrow.

Experiment 5: 4-bit Binary Adder

To implement a 4-bit parallel adder using IC 7483 and demonstrate ripple carry propagation in multi-bit addition.

Experiment 6: Multiplexer Applications

To study 8:1 multiplexer (IC 74151) operation and implement Boolean functions using multiplexer as a universal logic element.

Experiment 7: Decoder and Encoder Circuits

To implement 3×8 decoder (IC 74138) and priority encoder (IC 74147) circuits and demonstrate their applications in digital systems.

Experiment 8: Code Converters

Objective: To design and implement Binary to Gray, Gray to Binary, and BCD to Excess-3 code converters using logic gates.

Experiment 9: Latches and Flip-Flops

Objective: To construct SR latch and verify the operation of D and JK flip-flops with emphasis on edge-triggering and timing characteristics.

TEXT BOOKS

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", Pearson Education, 6th Edition, 2018.
2. R.P. Jain, "Modern Digital Electronics", McGraw Hill Education, 4th Edition, 2017.

REFERENCE BOOK

1. Thomas L. Floyd, "Digital Fundamentals", Pearson Education, 11th Edition, 2015.
2. Anil K. Maini, "Digital Electronics: Principles and Integrated Circuits", Wiley India, 2017.

3. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", Oxford University Press, 5th Edition, 2018.

WEB RESOURCES

1. NPTEL Course - Digital Circuits and Systems: https://nptel.ac.in/courses/108/105/108105134/
2. CircuitVerse - Digital Circuit Simulator: https://circuitverse.org/
3. Falstad Circuit Simulator: https://www.falstad.com/circuit/

CO-PO -PSO Mapping

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

Assessment Methodology	Assessment Tools	Marks
Theory Test		15
Logic design project	Hardware implementation	10
Digital system simulation (Quartus/Vivado)	Demo and viva	10
Model Practical		10
Attendance		5
Total		50

25UECP21	**Electric Circuits and Machines Laboratory**	**Category**	**L**	**T**	**P**	**Credit**
		ES	0	0	2	1

Course Prerequisite

- Fundamentals of Electrical Machines (25UECT23)
- Basic understanding of electrical safety

Course Objective

This laboratory course provides practical experience in electrical machines, circuit analysis, and basic electronics applications. The objectives are to:

- Understand operation and characteristics of electrical machines
- Gain hands-on experience with AC/DC circuit analysis
- Learn measurement techniques for electrical parameters
- Develop skills in motor control and protection systems
- Apply safety practices in electrical laboratory environment

Course Outcome

On the successful completion of the course, students will be able to

CO No.	**Course Outcomes**	**Blooms Taxonomy level**
CO1	Measure and analyze power factor in AC circuits and implement capacitive compensation techniques for power quality improvement	Analyze
CO2	Conduct standard tests on single-phase and three-phase transformers to determine equivalent circuit parameters, efficiency, and regulation	Apply
CO3	Evaluate performance characteristics of DC generators and motors including speed control and starting methods	Evaluate
CO4	Analyze the operational characteristics of single-phase and three-phase induction motors through performance testing	Analyze
CO5	Compare and assess different machine configurations and control methods for optimal performance in electrical systems	Evaluate

List of Experiments

Experiment 1: Power Factor Improvement To measure power factor in AC circuits and demonstrate improvement using capacitor compensation with before-and-after analysis.

Experiment 2: Single-Phase Transformer Testing : To perform open circuit and short circuit tests on single-phase transformer to determine equivalent circuit parameters, efficiency, and regulation.

Experiment 3: Transformer Load Test : To analyse transformer performance under various loading conditions and plot voltage regulation, losses, and efficiency curves.

Experiment 4: Three-Phase Transformer Connections To study star-star and delta-delta connections of three-phase transformers, identify vector groups, and analyze load sharing in parallel operation.

Experiment 5: DC Generator Characteristics To determine and plot the external and internal characteristics of separately excited, shunt, and series DC generators including voltage build-up process.

Experiment 6: DC Motor Characteristics : To obtain speed-torque characteristics of DC shunt and series motors and demonstrate various speed control methods.

Experiment 7: DC Motor Starting and Control : To study three-point and four-point starters for DC motors and perform brake test to determine efficiency with field and armature speed control methods.

Experiment 8: Three-Phase Induction Motor: To conduct no-load and blocked rotor tests on three-

phase induction motor to determine equivalent circuit parameters, slip-torque characteristics, and efficiency.

Experiment 9: Single-Phase Induction Motor: To study starting methods and obtain speed-torque characteristics of capacitor-start single-phase induction motor with performance comparison.

TEXTBOOKS

1. A. Chakrabarti, "Circuit Theory: Analysis and Synthesis", Dhanpat Rai Publications, 7th Edition, 2018.
2. I.J. Nagrath and D.P. Kothari, "Electric Machines", Tata McGraw Hill, 5th Edition, 2019.

REFERENCE BOOKS

1. A.E. Fitzgerald, Charles Kingsley Jr., and Stephen D. Umans, "Electric Machinery", McGraw-Hill, 7th Edition, 2013.
2. B.S. Guru and H.R. Hiziroglu, "Electric Machinery and Transformers", Oxford University Press, 3rd Edition, 2000.
3. James W. Nilsson and Susan A. Riedel, "Electric Circuits", Pearson, 11th Edition, 2019.
4. P.S. Bimbhra, "Electrical Machinery", Khanna Publishers, 7th Edition, 2011.

ONLINE/NPTEL COURSES

1. NPTEL Electrical Machines Laboratory - https://nptel.ac.in/courses/108/105/108105053/
2. Virtual Labs - Electrical Machines Lab - http://vlabs.iitb.ac.in/vlabs-dev/labs/eerc03/
3. MIT OpenCourseWare - Circuits and Electronics - https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

Mapping with Programme Outcomes

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

Assessment Methodology	**Assessment Tools**	**Marks**
Laboratory Conduction	Observation	10
Record work		10
Model exam		15
Viva		5
Virtual lab assignment	Review	10
Attendance		10
Total		60

25UECP22	ELECTRONICS FABRICATION LAB	Category	L	T	P	Credit
		ES	0	0	2	1

Course Objective

- To provide hands-on experience in designing printed circuit boards from schematic capture to layout generation using industry-standard EDA tools, enabling students to create professional-quality electronic circuit designs.
- To train students in multiple PCB manufacturing methods including photolithographic chemical etching and CNC milling, fostering understanding of fabrication constraints and design for manufacturability principles.
- To develop professional-level soldering skills for both through-hole and surface mount components, ensuring students can reliably assemble and rework modern electronic circuits.
- To equip students with 3D printing skills for creating custom enclosures, fixtures, and mechanical components essential for complete electronic product development.
- To cultivate the ability to combine multiple fabrication techniques for creating functional electronic prototypes, emphasizing quality control, testing, and troubleshooting methodologies.

Course Outcomes:

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Bloom's Taxonomy Level
CO1	Design and generate manufacturing-ready PCB layouts using professional EDA tools with proper component selection and routing techniques	Create
CO2	Fabricate single and multi-layer PCBs using chemical etching and CNC milling processes while adhering to safety protocols	Apply
CO3	Execute professional soldering techniques for through-hole and SMD components with consistent quality and reliability	Apply
CO4	Design and manufacture custom electronic enclosures and mechanical fixtures using 3D printing technology	Create
CO5	Integrate multiple fabrication techniques to produce complete, tested, and functional electronic prototypes	Evaluate

LIST OF EXPERIMENTS

Experiment 1: Introduction to PCB Design Software

To familiarize with EDA tools and create simple schematic diagrams using KiCad/Eagle for basic electronic circuits.

Experiment 2: Schematic Capture and Component Libraries

To design complete circuit schematics with proper component selection, library management, and design rule checking (DRC) for a given electronic application.

Experiment 3: PCB Layout Design

To convert schematic designs into PCB layouts with proper component placement, routing, and generation of Gerber files for manufacturing.

Experiment 4: Single-Layer PCB Fabrication - Chemical Etching

To fabricate single-layer PCBs using photolithography process including photo-resist preparation, UV exposure, development, and chemical etching.

Experiment 5: Double-Layer PCB Fabrication - CNC Milling

To produce double-sided PCBs using CNC milling machine with isolation routing, via drilling, and precise layer alignment techniques.

Experiment 6: Through-Hole Soldering Techniques

To master through-hole component soldering skills including proper iron temperature control, flux application, and solder joint inspection for reliable connections.

Experiment 7: Surface Mount Device (SMD) Soldering

To develop proficiency in SMD soldering techniques using hot air rework station, solder paste application, and reflow methods for modern electronic assembly.

Experiment 8: 3D Printing for Electronic Enclosures

To design and fabricate custom electronic enclosures using FDM 3D printing technology with appropriate material selection and post-processing techniques.

Experiment 9: Advanced 3D Printing Applications

To create specialized electronic components including heat sinks, cable organizers, sensor mounts, and mechanical fixtures using additive manufacturing.

Experiment 10: PCB Assembly and Testing

To complete full PCB assembly combining fabricated boards with soldered components, followed by functional testing, troubleshooting, and quality verification

TEXTBOOKS

1. Clyde F. Coombs Jr. and Happy T. Holden, "Printed Circuits Handbook", McGraw-Hill, 7th Edition, 2016.
2. Simon Monk, "Make: Electronics - Learning by Discovery", O'Reilly Media, 3rd Edition, 2022.
3. Jan Axelson, "Making Printed Circuit Boards", Tab Books, 2nd Edition, 2018.

REFERENCE BOOKS

1. David L. Jones, "PCB Design Tutorial", CreateSpace Independent Publishing, Revised Edition, 2019.
2. Charles Platt, "Encyclopedia of Electronic Components (Volume 1-3)", O'Reilly Media, 2016.
3. Ben Redwood, Filemon Schöffer, and Brian Garret, "The 3D Printing Handbook: Technologies, Design and Applications", 3D Hubs, 2017.
4. Kraig Mitzner, "Complete PCB Design Using OrCAD Capture and PCB Editor", Newnes, 2nd Edition, 2019.

Web resources

1. KiCad Official Documentation and Tutorials https://www.kicad.org/
2. Adafruit Learning System https://learn.adafruit.com/
3. PCBWay Design Guidelines and Capabilities https://www.pcbway.com/capabilities.html
4. Instructables Electronics Section https://www.instructables.com/circuits/
5. Thingiverse Electronics Category https://www.thingiverse.com/tag:electronics
6. EEVblog YouTube Channel and Forum https://www.youtube.com/user/EEVblog

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1:	3	3			3			1			2
CO2:	3	3			3			1			
CO3:	3	3			3			1			
CO4:	3	3			3			1			2
CO5:	3	3			3			1			

Assessment Methodology	Assessment Tools	Marks
Laboratory Conduction	Observation	10
Record work		10
Model exam		15
Viva		5
PCB design and fabrication	Working prototype demo	5
3D Model contest	Review	5
Attendance		10
Total		60

25UPCE21	Communication skills	Category	L	T	P	Credit
		EEC	0	0	2	0

Prerequisite: Career Development Skills

Course Objective

- To develop effective interpersonal communication skills and enhance students' ability to interact professionally in team environments and collaborative settings.
- To strengthen verbal and non-verbal communication abilities through practical exercises in listening, conversation, presentation, and public speaking skills.
- To improve written communication competency by developing clarity, conciseness, and audience awareness in various forms of written expression.
- To build self-awareness and analytical thinking through SWOT analysis and self-assessment techniques for personal and professional development.
- To foster teamwork and leadership qualities through active participation in group activities, debates, conflict resolution, and collaborative problem-solving exercises.

Course Outcomes

CO. NO	Course Outcomes	Affective Domain Level
CO1	Value sustained motivation and appreciate the importance of interpersonal skills for effective communication and teamwork.	Valuing
CO2	Respond positively to active listening opportunities and demonstrate willingness to engage in collaborative team interactions.	Responding
CO3	Organize personal reading and writing habits to consistently practice critical analysis and audience-focused expression.	Organization
CO4	Characterize personal strengths and weaknesses through SWOT analysis while demonstrating confidence in public speaking situations.	Characterization
CO5	Receive feedback constructively during team collaboration activities and show openness to participate in debates and group problem-solving.	Receiving

Syllabus

MODULE 1 (6 Hours)

Motivation – II: Intrinsic vs. Extrinsic Motivation - Goal Setting and Achievement - Building and Sustaining Motivation

Interpersonal Skills: Effective Communication - Active Listening - Conflict Resolution - Teamwork and Collaboration

MODULE 2 (6 Hours)

Listening Skills: Roles and Responsibilities in a Team - Building Trust and Respect Among Team Members – Effective Team Communication

Conversation Skills: Starting and Maintaining a Conversation - Non-Verbal Communication Cues - Active Listening and Responding

MODULE 3 (6 Hours)

Reading Skills: Skimming and Scanning Techniques – Critical reading and Interpretation

Writing Skills: Grammar and Syntax - Clarity and Conciseness - Audience Awareness

MODULE 4 (6 Hours)

Presentation Speaking Skills: Speech Structure and Organization – Verbal Delivery Techniques

Public Speaking Skills: Confidence and overcoming Anxiety – Effective message Delivery

SWOT Analysis: Identifying Internal Factors – Analyzing External Factors

MODULE 5 (6 Hours)

Team Building: Roles and Responsibilities in a team – Communication and Trust – Conflict resolution and Problem Solving

Active Sessions: Debate – Picture Connector

TEXT BOOKS

1. Chakravathi, T. Kalyana. Soft Skills for Managers. New Delhi: McGraw Hill Education, 2018.
2. Mitra, Barun K. Personal Development and Soft Skills. Oxford: Oxford Higher Education, 2011.

REFERENCE BOOKS

1. Goleman, Daniel. The Emotionally Intelligent Workplace. New York: Bantam Books, 2001.
2. Kumar, E. Suresh, P. Sreehari, and J. Savithri. Communication Skills and Soft Skills: An Integrated Approach. Chennai: Pearson India, 2015.
3. Rajendra, Charles T. Top Talking in English (International Communication Skills). New Delhi: Sultan Chand & Sons, 2010.
4. Suryavanshi, Raj Lakshmi. Soft Skills. Pune: Gurucool Publishing, 2016.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1:							2	2	2		3

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO2:							2	2	2		3
CO3:							2	2	2		3
CO4:							2	2	2		3
CO5:							2	2	2		3

Assessment Methodology	Assessment Tools	Marks
Test 1 (Modules 1-2)	Internal Tests	15
Test 2 (Modules 3-5)	Internal Tests	15
Presentation Skills Demonstration	Practical Assessment	15
Public Speaking and Confidence Assessment	Practical Assessment	10
SWOT Analysis Report	Assignment	10
Active Listening and Conversation Skills Demo	Practical Assessment	10
Team Building Activity and Leadership Role	Project	10
Debate Participation and Performance	Practical Assessment	10
Attendance and Class Participation	Continuous Assessment	5
		100

25UMCC21	IKS IN HUMANITIES AND SOCIAL SCIENCE	Category	L	T	P	Credit
		MCC	0	0	2	0

Course Prerequisite

- Basic understanding of Indian history and culture

Course Objective

This course explores Indian Knowledge Systems in the context of humanities and social sciences, providing students with a deeper understanding of India's intellectual heritage. The objectives are to:

- Understand the philosophical foundations of Indian knowledge traditions
- Explore Indian contributions to social sciences, literature, and arts
- Analyze the relevance of ancient wisdom in contemporary social contexts
- Develop appreciation for cultural diversity and heritage

Foster critical thinking about knowledge systems and their applications

Course Outcome

On the successful completion of the course, students will be able to:

CO. No.	Course Outcomes	Blooms Taxonomy level
CO1	Understand the philosophical foundations and methodologies of Indian knowledge systems in humanities	Understand
CO2	Analyze Indian contributions to literature, arts, social organization, and governance systems	Analyze
CO3	Apply principles from Indian philosophical traditions to contemporary social and ethical issues	Apply
CO4	Evaluate the relevance and adaptability of traditional knowledge in modern social contexts	Evaluate
CO5	Create connections between ancient wisdom and contemporary challenges in society	Create

Syllabus

Module I: Philosophical Foundations of Indian Knowledge Systems (6 Hours)

Darshanas (Schools of Philosophy): Samkhya, Yoga, Nyaya, Vaisheshika, Mimamsa, Vedanta - Epistemology in Indian philosophy: Pramanas (means of knowledge) - Ethics and moral philosophy in Indian traditions - Concept of Dharma, Artha, Kama, and Moksha - Comparative study with Western philosophical traditions

Module II: Indian Literary and Artistic Traditions (6 Hours)

Sanskrit literature: Vedas, Upanishads, Puranas, Epics (Ramayana, Mahabharata) - Classical poetry and drama: Kalidasa, Bhartrhari, Bhasa - Regional literature and folk traditions - Indian classical music and dance: Theoretical foundations - Visual arts: Sculpture, painting, and architectural styles - Aesthetics in Indian tradition: Rasa theory and Alamkara shastra

Module III: Social Organization and Governance (6 Hours)

Ancient Indian social structure and organization - Varna and Ashrama systems: Historical context and evolution - Village self-governance: Panchayati Raj origins - Arthashastra: Principles of statecraft and administration - Justice system: Dharmashastra and Rajadharma - Economic systems: Trade, agriculture, and crafts

Module IV: Educational Systems and Knowledge Transmission (6 Hours)

Gurukula system: Teacher-student relationship - Ancient universities: Nalanda, Takshashila, Vikramshila - Oral tradition and preservation of knowledge - Women's education in ancient India - Integration of spiritual and material learning - Comparison with modern educational approaches

Module V: Contemporary Relevance and Applications (6 Hours)

Indian knowledge systems in modern governance - Traditional conflict resolution mechanisms - Environmental consciousness in Indian traditions - Community-based development models - Gender studies: Women in Indian philosophical traditions - Relevance of Indian ethics in corporate governance - Cultural preservation and modernization challenges

Text Book

1. S. Radhakrishnan, "Indian Philosophy", Oxford University Press, 2008
2. A.L. Basham, "The Wonder That Was India", Rupa Publications, 2017
3. Kapila Vatsyayan, "Traditional Indian Art and Culture", Cambridge University Press, 2015

Reference Book & Web Resources

1. Heinrich Zimmer, "Philosophies of India", Princeton University Press, 1989
2. Romila Thapar, "Early India: From the Origins to AD 1300", Penguin Books, 2015
3. K.M. Munshi, "The History and Culture of the Indian People", Bharatiya Vidya Bhavan
4. Digital Library of India: https://www.dli.gov.in
5. Sahapedia - Encyclopedia of Indian Culture: https://www.sahapedia.org
6. Indian Council of Historical Research: https://ichr.ac.in
7. Archaeological Survey of India: https://asi.nic.in

Mapping with Programme Outcomes

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO4	2					3	3		3		3		
CO5	3					3	3		3		3		

Assessment Methodology	Assessment Tools	Marks
Philosophical Analysis Assignment	Assignment	25
Comparative Study Project (Ancient vs Modern)	Project	20
Literary/Artistic Tradition Presentation	Presentation	20
Heritage Site Visit and Report	Field Work	10
Contemporary Application Case Study	Assignment	15
Attendance and Class Participation	Continuous Assessment	10
Total		100

25UMCC22	**HOLISTIC WELLNESS**	**Category**	**L**	**T**	**P**	**Credit**
		MCC	0	0	1	0

Course Objective

This course promotes physical fitness, mental well-being, and holistic development of students. The objectives are to:

- Develop physical fitness and motor skills through sports activities
- Learn yoga techniques for stress management and mental clarity
- Understand the importance of physical activity for academic performance
- Promote teamwork, leadership, and sportsmanship
- Establish lifelong habits for health and wellness

Course Outcome

On the successful completion of the course, students will be able to

CO No.	Course Outcomes	Blooms Taxonomy level
CO1	**Execute** fundamental movement patterns and sport-specific techniques to demonstrate improved physical fitness, coordination, and motor skills through consistent practice and participation in various sports activities.	**Psychomotor - Mechanism Level**
CO2	**Perform** yoga sequences and breathing techniques with precision and fluency to effectively manage stress levels and enhance mental well-being in daily life situations.	**Psychomotor - Complex Overt Response Level**
CO3	C**ollaborate** effectively in team sports while demonstrating	**Affective -**

	leadership qualities, displaying consistent fair play behaviors, and **resolving** conflicts constructively to maintain positive team dynamics.	**Organization Level**
CO4	**Construct** and **modify** evidence-based arguments examining the correlation between regular physical activity participation and academic performance outcomes through data analysis and personal reflection.	**Psychomotor - Adaptation Level**
CO5	**Design** and **implement** personalized fitness plans incorporating cardiovascular, strength, flexibility, and skill-based components that align with individual health goals and promote lifelong wellness habits.	**Psychomotor - Origination Level**
CO6	**Internalize** the value of physical activity and **advocate** for healthy lifestyle choices, demonstrating a personal commitment to regular exercise and wellness practices beyond the academic setting.	**Affective - Characterization Level**

Syllabus
Module I: Introduction to Physical Fitness **(3 Hours)** Importance of physical fitness for students - Components of fitness: strength, endurance, flexibility, coordination - Fitness assessment and goal setting - Safety guidelines and injury prevention - Warm-up and cool-down techniques
Module II: Sports Activities **(9 Hours)**
Option A: Team Sports (Choose any two) - Cricket: Basic skills, rules, and match play - Football: Fundamental techniques and game strategies - Basketball: Shooting, dribbling, and team coordination - Volleyball: Serving, spiking, and court positioning - Badminton: Strokes, footwork, and doubles play **Option B: Individual Sports (Choose any two)** - Athletics: Running, jumping, and throwing events - Table Tennis: Basic strokes and match play - Tennis: Forehand, backhand, and court coverage - Swimming: Basic strokes and water safety - Cycling: Technique and endurance building
Module III: Yoga and Mindfulness **(3 Hours)** Introduction to yoga philosophy and benefits - Basic yoga asanas (postures): Sun salutation, standing poses, seated poses - Pranayama (breathing techniques): Deep breathing, alternate nostril breathing - Meditation and mindfulness practices - Relaxation techniques and stress management
Practical Activities **(3 Hours)**
Yoga Sessions: - Daily morning yoga practice - Guided meditation sessions - Breathing exercise workshops - Stress relief techniques - Mindfulness activities

Text Book

1. "Complete Guide to Physical Fitness" - Physical Education Department Manual
2. B.K.S. Iyengar, "Light on Yoga", Harper Thorsons, 1991

Reference Book & Web Resources

1. "Sports Training Principles" by Frank W. Dick, A&C Black, 2007
2. Swami Muktibodhananda, "Hatha Yoga Pradipika", Yoga Publications Trust, 2012

Mapping with Programme Outcomes

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

Assessment Methodology	Assessment Tools	Marks
Sports Skills Demonstration (Team/Individual Sports)	Practical Assessment	25
Yoga Asanas and Breathing Techniques Performance	Practical Assessment	25
Personal Fitness Plan Development and Implementation	Practical Assessment	25
Physical Activity and Academic Performance Analysis	Practical Assessment	25
Total		100