ACHARIYA

COLLEGE OF ENGINEERING TECHNOLOGY

AN AUTONOMOUS INSTITUTION

(Approved by AICTE, New Delhi, and affiliated to Pondicherry University)

Accredited by NAAC & ISO 9001:2008 Certified Institution

Pondicherry – 605010

Curriculum and Syllabus

for

B. Tech. (Information Technology)

REGULATION - 2026

(Effective from Academic year 2026-27)

(Subject to the Approval of the First Academic Council meeting of Achariya College of Engineering Technology)

DEPARTMENT OF INFORMATION TECHNOLOGY

ACHARIYA COLLEGE OF ENGINEERING TECHNOLOGY

COLLEGE VISION & MISSION

VISION

To be a center of excellence in technical education, producing globally competent and ethically strong engineering professionals who contribute to the development of society and nation.

MISSION

1. Provide high-quality engineering education through state-of-the-art infrastructure.
2. Foster innovation, research, and entrepreneurship among students.
3. Maintain lifelong connection with alumni and industry partners.
4. Inculcate moral values and psychological well-being.

DEPARTMENT VISION

To be a centre of excellence in Information Technology, producing globally competent professionals

with strong ethical values

DEPARTMENT MISSION

The department endeavors to

1. Create vibrant learning environment that encourages innovation, research, and life-long learning in the IT domain.
2. Improve students' communication, analytical and managerial skills.
3. Strengthen industry-academia collaboration.
4. Enhance employability through certification and placement training.
5. Promote research, innovation and entrepreneurship

CURRICULUM AND SYLLABUS

The Curriculum of B.Tech. (Information Technology) is designed to fulfil the Program Educational Objectives (PEO) and the Program Outcomes (PO) listed below.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO1	PROFESSIONAL COMPETENCE: Graduates will apply the knowledge and skills acquired during their education to analyse, design and implement computer-based systems, demonstrating competence in their chosen field of Information Technology.
PEO2	ENTREPRENEURSHIP AND INNOVATION: Graduates will apply creativity and innovation in problem-solving and exhibit an entrepreneurial mindset, potentially leading to the creation of new products, services or businesses.
PEO3	CONTRIBUTION TO RESEARCH AND DEVELOPMENT: Graduates will contribute to the advancement of knowledge in Information Technology through research, publications or involvement in research and development activities.
PEO4	ENGAGEMENT WITH THE COMMUNITY: Graduates will actively participate in community and professional activities, sharing their expertise and contributing to the betterment of the community and the profession.

PROGRAM OUTCOMES (PO)

PO1	**Engineering Knowledge**	Apply the knowledge of Mathematics, Natural science, Computing, Engineering Fundamentals and an Engineering Specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems
PO2	**Problem Analysis**	Identify, formulate review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development (WK1-WK4)
PO3	**Design / Development of solutions**	Design creative solutions for complex engineering problems and design / develop systems / components / processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4	**Conduct Investigations of complex problems**	Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis and interpretation of data to provide valid conclusions (WK8).
PO5	**Engineering Tool Usage**	Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems (WK2 & WK6).
PO6	**The Engineer and the world**	Analyse and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment (WK1, WK5 and WK7).
PO7	**Ethics**	Apply ethical principles and commit to professional ethics, human values. 4 Diversity and inclusion, adhere to national and international laws (WK9).
PO8	**Individual and Collaborative Team Work**	Function effectively as an individual, and as a member or leader in diverse / multi-disciplinary teams.
PO9	**Communication**	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentations, make effective presentations considering cultural, language, and learning Differences
PO10	**Project Management and Finance**	Apply knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	**Life-long learning**	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8).

KNOWLEDGE AND ATTITUDE PROFILE (WK)

WK1	**Natural Sciences**	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences
WK2	**Mathematics**	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline
WK3	**Engineering Fundamentals**	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
WK4	**Specialist Knowledge**	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	**Engineering Design/Ops**	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice Area
WK6	**Engineering Practice**	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
WK7	**Society & Sustainability**	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable Development
WK8	**Research Literature**	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues
WK9	**Ethics & Conduct**	Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO1	Apply principles of Information Technology, computing, and data-driven methodologies to develop efficient solutions for real-world problems and emerging technological challenges.
PSO2	Utilize modern hardware, software, networking, cloud computing, cybersecurity, and data analytics tools to design and implement scalable, secure, and industry-relevant IT solutions.

SUSAINABLE DEVELOPMENT GOALS

SDG01	**No Poverty**	End poverty in all its forms everywhere (eradicate extreme poverty currently measured as people living on less than $1.25 a day.)
SDG02	**Zero Hunger**	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
SDG03	**Good Health and Well-being**	Ensure healthy lives and promote well-being for all at all ages
SDG04	**Quality Education**	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
SDG05	**Gender Equality**	Achieve gender equality and empower all women and girls
SDG06	**Clean Water and Sanitation**	Ensure availability and sustainable management of water and sanitation for all
SDG07	**Affordable and Clean Energy**	Ensure access to affordable, reliable, sustainable and modern energy for all
SDG08	**Decent Work and Economic Growth**	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
SDG09	**Industry, Innovation, and Infrastructure**	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
SDG10	**Reduced Inequalities**	Reduce inequality within and among countries
SDG11	**Sustainable Cities and Communities**	Make cities inclusive, safe, resilient, and sustainable.
SDG12	**Responsible Consumption and Production**	Ensure sustainable consumption and production patterns.

SDG13	**Climate Action**	Ensure sustainable consumption and production patterns.

SDG14	**Life Below Water**	Conserve and sustainably use marine resources.
SDG15	**Life on Land**	Protect ecosystems, manage forests, combat desertification, and halt biodiversity loss.
SDG16	**Peace, Justice, and Strong Institutions**	Promote peaceful societies, access to justice, and effective institutions.
SDG17	**Partnerships for the Goals**	Strengthen the global partnership for sustainable development.

DEFINITION OF CREDIT

TEACHING ACTIVITY	CREDIT EQUIVALENT
1 Hour Lecture (L) per week per semester	**1 Credit**
1 Hour Tutorial (T) per week per semester	**1 Credit**
2 Hours Practical / Laboratory (P) per week per semester	**1 Credit**

SCHEME OF CREDIT DISTRIBUTION-SUMMARY

	I	II	III	IV	V	VI	VII	VIII	Total
Basic Science Courses	7	8.5	4	-	-	-	-	-	19.5
Engineering Science Courses	10.5	9	-	-	-	-	-	-	19.5
Professional Core Courses	-	-	17.5	19.5	16	10.5	6	-	69.5
Professional Elective Courses	-	-	-	-	-	3	3	3	9
Humanities and Social Management	3	3	-	-	3	1.5	-	-	10.5
Open Elective Courses	-	-	-	-	-	3	3	3	9
Project	-	-	-	-	1	2	5	6	14
Mandatory Courses	-	-	-	-	-	-	-	-	-
Career Development Skill	1	1	1	1	1	1	-	-	6
Skill Development Laboratory	-	-	-	1	1	1	1	-	4
TOTAL	**21.5**	**21.5**	**22.5**	**21.5**	**22**	**22**	**18**	**12**	**161**

STRUCTURE OF THE UG PROGRAMME (Total: 163 Credits)

Sl. No.	CODE	CATEGORY	SUGGESTED CREDITS (163)	CREDIT POINTS (161)
1	BSC	Basic Science Courses	23*	19.5
2	ESC	Engineering Science Courses	29*	19.5
3	PCC	Professional Core Courses	59*	69.5
4	PEL	Professional Elective Courses	12*	9
5	HSM	Humanities and Social Management	16*	10.5
6	OEL	Open Elective Courses	09*	9
7	PROJ	Project / Internship / Seminar	15*	14
8	SDL	Skill Development Laboratory	04*	4
9	MAN	Mandatory Courses	Non Credit	-
10	CDS	Employability Enhancement Skill – I	06	6
		Total Credits	160-165	161

ABBREVIATION

S.NO	ABBREVIATION	FULL FORM
1	BSC	Basic Science Courses
2	ESC	Engineering Science Courses
3	HSM	Humanities and Social Management
4	CDS	Career Development Skill
5	PCC	Professional Core Courses
6	MAN	Mandatory Courses
7	PROJ	Project
8	PEC	Professional Elective Courses
9	OEC	Open Elective Courses
10	PET	Physical Education & Training
11	AEC	Ability Enhancement Course
12	SDL	Skill Development Learning
13	MA	Mathematics
14	UH	Universal Human Values
15	CS	Computer Science
16	IT	Information Technology
17	BO	Biology
18	ME	Mechanical Engineering
19	CD	Carrier Development
20	PE	Physical Education
21	EN	English
22	EE	Electrical & Electronics
23	PC	Physics & Chemistry
24	NS	National Social Service
25	MN	Mandatory
26	NIH	NPTEL / Internship / Hackathon
27	YOC	Yoga

List of Program Offered

S.No.	Programme	Programme Code
UNDER GRADUATE		
B.Tech., Programmes Offered		
1	B.Tech., - Artificial Intelligence and Data Science	AD
2	B.Tech., - Computer Science Engineering	CS
3	B.Tech., - Electronics and Communication Engineering	EC
4	B.Tech., - Electrical and Electronics Engineering	EE
5	B.Tech., - Mechanical Engineering	ME
6	B.Tech., - Information Technology	IT
7	B.Tech., - Robotics and Automation	RA
8	B.Tech., - Computer Science Engineering *(IOT including Cyber Security and Blockchain Technology)*	CB
POSTGRADUATE		
M.Tech., Programmes Offered		
1	M.Tech., - Artificial Intelligence and Data Science	AS
MBA		
1	MBA – General	MA

SEMESTER-WISE COURSES AND CREDITS

I SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	ESE	Total	Category
MAC26101	Matrices and Calculus	3	1	0	4	4	4	40	60	100	BSC
UHC26102	Universal Human Values	3	0	0	3	1	3	40	60	100	HSM
CSC26103	Problem Solving and Python Programming	3	0	0	3	4	3	40	60	100	ESC
ITT26104	IT Essentials	3	0	0	3	2	3	40	60	100	ESC
BOT26105	Biology for Information Technology	3	0	0	3	2	3	40	60	100	BSC
CSL26101	Python Programming Laboratory	0	0	3	3	2	1.5	60	40	100	ESC
MEL26102	Engineering Workshop Laboratory	0	0	3	3	-	1.5	60	40	100	ESC
DTL26103	Design Thinking and Idea Laboratory	0	0	3	3	-	1.5	60	40	100	ESC
CDC26101	Career Development Skill – I	0	0	2	2	-	1	100	-	100	CDS
PEC26101	Physical Education	0	0	1	1	-	0	100	-	100	PET
TOTAL		**15**	**1**	**12**	**28**	**15**	**21.5**				

II SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	ESE	Total	Category
MAC26201	Partial Differential Equations and Transforms	3	1	0	4	3	**4**	40	60	100	BSC
ENC26202	Technical English and Communication	3	0	0	3	1	**3**	40	60	100	HSM
EEC26203	Basic Electrical and Electronics Engineering	3	0	0	3	1	**3**	40	60	100	ESC
PCT26204	Physics and Chemistry for Information Technology	3	0	0	3	1	**3**	40	60	100	BSC
CST26205	Programming in C	3	0	0	3	3	**3**	40	60	100	ESC
EEL26201	Basic Electrical and Electronics Engineering Laboratory	0	0	3	3	-	**1.5**	60	40	100	ESC
PCL26202	Physical Sciences Laboratory (Physics & Chemistry Laboratory)	0	0	3	3	-	**1.5**	60	40	100	BSC
MEL26203	Engineering Graphics Laboratory	0	0	3	3	-	**1.5**	100	-	100	ESC
CDC26201	Career Development Skill – II	0	0	2	2	-	**1**	100	-	100	CDS
NSC26201	National Social Service / Village Camp / Rally	0	0		0	-	**0**	0	0	100	NSS
TOTAL		**15**	**1**	**11**	**27**	**9**	**21.5**	**-**	**-**	**-**	**-**

III SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	ESE	Total	Category
MAC26301	Statistics and Numerical methods	3	1	0	4	2	**4**	40	60	100	BSC
ITT26302	Data structures	3	1	0	4	2	**4**	40	60	100	PCC
ITT26303	Digital electronics and system	3	0	0	3	3	**3**	40	60	100	PCC
ITT26304	Object oriented programming	3	0	0	3	2	**3**	40	60	100	PCC
ITT26305	Computer Organization and Architecture	3	0	0	3	-	**3**	40	60	100	PCC
MNC26306	Environmental Science	2	0	0	2	-	**-**	100	-	100	MAN
ITL26301	Data structures Laboratory	0	0	3	3	-	**1.5**	60	40	100	PCC
ITL26302	Digital electronics and system lab	0	0	3	3	-	**1.5**	60	40	100	PCC
ITL26303	Object Oriented Programming Laboratory	0	0	3	3	-	**1.5**	60	40	100	PCC
CDC26301	Career Development Skill – III	0	0	2	2	-	**1**	100	-	100	CDS
PEC26302	Physical Education	0	0	1	1	1		100	-	100	PE
	TOTAL	**17**	**2**	**12**	**31**	**10**	**22.5**	-	-	-	

IV SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	ESE	Total	Category
ITT26C401	Design and Analysis of Algorithm	3	0	0	3	2	**3**	40	60	100	PCC
ITT26402	Web Technology	3	0	0	3	2	**3**	40	60	40	PCC
ITT26403	Operating Systems	3	0	0	3	1	**3**	40	60	40	PCC
ITT26404	Database Management Systems	3	0	0	3	1	**3**	40	60	40	PCC
ITT26404	Information Coding Techniques	3	0	0	3	2	**3**	40	60	40	PCC
ITL26401	Operating Systems Lab	0	0	3	2	-	**1.5**	60	40	100	PCC
ITL26402	Database Management Systems Lab	0	0	3	2	-	**1.5**	60	40	100	PCC
ITL26403	Web Technology Lab	0	0	3	2	-	**1.5**	60	40	100	PCC
NIH26001	NPTEL / Internship / Hackathon	0	0	2	2	-	**1**	100	-	100	SDL
CDC26401	Career Development Skill – IV	0	0	2	2	-	**1**	100	-	100	CDS
YOC26401	Yoga	0	0	1	-	-	**0**	100	-	100	YOC
	TOTAL	**15**	**0**	**11**	**25**	**8**	**21.5**	-	-	-	

V SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	ESE	Total	Category
ITT26501	Computer Networks	3	1	0	4	2	**4**	40	60	100	PCC
ITT26502	Cloud and Ubiquitous Computing	3	0	0	3	2	**3**	40	60	100	PCC
ITT26503	Software Engineering	3	0	0	3	-	**3**	40	60	100	PCC
ITT26504	Embedded Systems and IoT	3	0	0	3	2	**3**	40	60	100	PCC
PMT26505	Principles of Management	3	0	0	3	-	**3**	40	60	100	HSM
MNC26506	Indian Constitution	2	0	0	2	-	**0**	100	-	100	MAN
ITL26501	Computer Networks Laboratory	0	0	3	3	-	**1.5**	60	40	100	PCC
ITL26502	Cloud Computing Laboratory	0	0	3	3	-	**1.5**	60	40	100	PCC
ITP26501	Micro Project	0	0	2	2	2	**1**	100	-	100	PROJ
NIH26001	NPTEL / Internship/Hackathon	0	0	0	2	2	**1**	100	-	100	SDL
CDC26501	Career Development Skill – V	0	0	2	2	-	**1**	100	-	100	CDS
	TOTAL	**17**	**1**	**10**	**30**	**10**	**22**				

VI SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	ESE	Total	Category
ITT26601	Information Security	3	0	0	3	1	**3**	40	60	100	PCC
ITT26602	Artificial Intelligence and Machine Learning	3	0	0	3	2	**3**	40	60	40	PCC
ITT26603	Distributed Computing	3	0	0	3	1	**3**	40	60	100	PCC
ITPE26XX	Professional Elective – I	3	0	0	3	1	**3**	40	60	100	PEC
ITOE26XX	Open Elective – I	3	0	0	3	1	**3**	40	60	100	OEC
ITL26601	Artificial Intelligence Laboratory	0	0	3	3	-	**1.5**	60	40	100	PCC
ENL26601	Communication Skills Laboratory	0	0	3	3	-	**1.5**	60	40	100	HSM
ITP26601	Mini Project	0	0	4	4	2	**2**	50	50	100	PROJ
NIH26001	NPTEL / Internship/ Hackathon	1	0	0	1	1	**1**	100	-	100	SDL
CDC26601	Career Development Skill – VI	0	0	2	2	2	**1**	100	-	100	CDS
	TOTAL	**16**	**0**	**12**	**28**	**11**	**22**	-	-	-	

VII SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	ESE	Total	Category
ITT26701	Cyber Security	3	0	0	3	1	**3**	40	60	100	PCC
ITT26702	Creative Innovation and Entrepreneurship	3	0	0	3	1	**3**	40	60	100	PCC
ITPE26XX	Professional Elective – II	3	0	0	3	1	**3**	40	60	100	PEC
ITOE26XX	Open Elective – II	3	0	0	3	1	**3**	40	60	100	OEC
ITP26701	Project Work - Phase I	0	0	6	6	6	**5**	50	50	100	PROJ
NIH26701	NPTEL / Internship/Hackathon	0	0	1	1	1	**1**	100	-	100	PROJ
TOTAL		**12**	**0**	**7**	**19**	**11**	**18**	-	-	-	-

VIII SEMESTER

Course Code	Course Title	L	T	P	Hrs/ Wk	SL	C	CIA	SEE	Total	Category
ITPE26XX	Professional Elective – III	3	0	0	3	1	**3**	40	60	100	PEC
ITOE26XX	Open Elective – III	3	0	0	3	1	**3**	40	60	100	OEC
ITP26801	Project Work – Phase II	0	0	12	16	10	**6**	50	50	100	PROJ
TOTAL		**6**	**0**	**12**	**22**	**12**	**12**	-	-	-	-

SEMESTER I

MAC26101	MATRICES AND CALCULUS	CATEGORY	L	T	P	CREDIT
		BSC	3	1	0	4

Course Prerequisite / Preamble

- Basic knowledge of algebra, trigonometry, and calculus.
- Understanding of matrices and elementary differential equations.
- Foundation for advanced engineering mathematics and applications.

Course Objective

- To introduce the concepts of Eigen values, Eigen vectors, matrix transformations, and quadratic forms.
- To develop problem-solving skills in multivariable differential calculus and optimization techniques.
- To provide knowledge of double and triple integrals and their applications in area and volume calculations.
- To familiarize students with vector calculus operations and integral theorems used in engineering applications.
- To enable students to solve higher order and simultaneous differential equations arising in scientific and engineering problems.

Course Outcome

CO1	Apply matrix algebra concepts including Eigen values, Eigen vectors, diagonalization, and quadratic forms to solve mathematical problems.	K3
CO2	Use multivariable differential calculus techniques to analyze functions of several variables and optimization problems.	K3
CO3	Evaluate double and triple integrals for computing area, volume, and coordinate transformations.	K3
CO4	Apply vector calculus operations and integral theorems to analyze vector fields and physical problems.	K3
CO5	Solve higher order and simultaneous differential equations using appropriate analytical methods.	K3

Syllabus

Unit 1	**Eigen Values and Quadratic Forms**	**(12)**

Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Cayley-Hamilton theorem (excluding proof) – Diagonalization of matrices – Reduction of Quadratic form to canonical form by using orthogonal transformation – Nature of a Quadratic form

Unit 2	**Multivariable Differential Calculus**	**(12)**

Partial derivatives (excluding Euler's theorem) – Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.		
Unit 3	**Multiple Integrals**	**(12)**
Double integrals – Change of order of integration – Double integrals in polar co-ordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals		
Unit 4	**Vector Calculus**	**(12)**
Vector Differential Operator – Gradient – Properties – Directional derivative – Divergence and Curl properties and relations – Solenoidal and Irrotational vector fields – Green's theorem – Stoke's theorem – Gauss divergence theorem.		
Unit 5	**Differential Equations**	**(12)**
Higher order linear differential equations with constant coefficients – Method of undetermined coefficients – Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.		

Total Hours: 60

Text Books:

1. B. S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 45th edition.
2. S. S. Sastry, *Engineering Mathematics Volume I*, Prentice Hall of India, 4th Edition.
3. N. P. Bali and Manish Goyal, *Engineering Mathematics*, Laxmi Publications, 10th Edition.
4. Erwin Kreyszig, *Advanced Engineering Mathematics*, Wiley India, 11th Edition, 2025

Reference:

1. Jain, R. K., and S. R. K. Iyengar. Advanced Engineering Mathematics. 5th ed., Narosa Publishing House, 2016.
2. Ramana, B. V. Higher Engineering Mathematics. McGraw Hill Education, 2006.
3. Singaravelu, A. Engineering Mathematics. 23rd ed., Meenakshi Agency, 2017.

Web / NPTEL Resources:

1. https://nptel.ac.in/courses/111105160
2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ma58
3. https://www.coursera.org/specializations/mathematics-engineers

CO-PO Mapping													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	1
CO2	3	3	-	-	-	-	-	-	-	-	-	1	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1	1
CO4	3	3	1	1	-	-	-	-	-	-	-	2	3
CO5	3	3	1	-	-	-	-	-	-	-	-	3	2

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Internal Test I	Written Examination	10
Internal Test II	Written Examination	10
Internal Test III	Written Examination	10
Assessment	Assignment	05
Attendance	Performance	05
Total		40

UHC26102	UNIVERSAL HUMAN VALUES- II	CATEGORY	L	T	P	CREDIT
		HSM	3	0	0	3

Course Objective
• To understand the significance of human values and ethical behavior. • To develop self-awareness and harmony in individual and social life. • To inculcate professional ethics and social responsibility among students. • To create awareness about sustainable living and environmental harmony. • To promote holistic development for responsible citizenship and professional practice

Course Outcome		
CO1	Understand the importance of human values and ethical principles.	K2
CO2	Apply self-exploration methods for personal development and harmony.	K3
CO3	Analyze the role of relationships, family, and society in human life.	K4
CO4	Interpret professional ethics and social responsibilities in engineering practice.	K4
CO5	Evaluate sustainable living practices for harmony with nature and society.	K5

Syllabus		
Unit 1	INTRODUCTION TO HUMAN VALUES	(9)
Need, basic guidelines, and content of value education – Self-exploration – Happiness and prosperity – Harmony in the human being – Understanding human aspirations – Continuous happiness and sustainable living – Right understanding, relationship, and physical facilities.		
Unit 2	HARMONY IN THE FAMILY AND SOCIETY	(9)
Family as the basic unit of human interaction – Values in relationships – Trust and respect – Understanding harmony in family – Justice in relationships – Human relationships and society – Role of education and culture in social harmony.		
Unit 3	PROFESSIONAL ETHICS AND HUMAN VALUES	(9)
Professional ethics – Engineering ethics – Ethical responsibilities of engineers – Integrity and accountability – Respect for human rights – Leadership qualities – Workplace ethics – Case studies on ethical dilemmas in professional life.		
Unit 4	ENVIRONMENT AND SUSTAINABILITY	(9)
Harmony with nature – Ecological balance – Environmental pollution and control – Sustainable development – Conservation of natural resources – Climate change and environmental ethics – Individual responsibility towards environment protection.		

Unit 5	HOLISTIC HUMAN DEVELOPMENT	9 hours

Holistic perception of harmony – Health and happiness – Social responsibility – Universal human order – Peace and coexistence – Humanistic education – Role of technology in societal development – Vision for a humane and sustainable society.

Total Hours: 45

Text Books:

1. Kapoor, Premvir. Professional Ethics and Human Values. Khanna Book Publishing, 2019.
2. R.R. Gaur, R. Sangal and G.P. Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, 3rd Revised Edition.
3. A.N. Tripathi, Human Values, New Age International Publishers, 4th Edition (2024).

Reference:

1. Leonard, Annie. The Story of Stuff: How Our Obsession with Stuff Is Trashing the Planet, Our Communities, and Our Health—and a Vision for Change. Free Press, 2010.
2. Tripathi, A. N. Human Values. 3rd ed., New Age International Publishers, 2009.
3. Gandhi, Mohandas Karamchand. The Story of My Experiments with Truth. Penguin, 2001.

Web / NPTEL Resources:

1. **https://onlinecourses.nptel.ac.in/e-learning/preview/noc20_ee67**

CO-PO Mapping

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

Assessment Methodology

Assessment Methodology	Assessment Tools	Marks
Internal Test I	Written Examination	10
Internal Test II	Written Examination	10
Internal Test III	Written Examination	10
Assessment	Assignment	05
Attendance	Performance	05
Total		40

ITT26103	PROBLEM SOLVING AND PYTHON PROGRAMMING	CATEGORY	L	T	P	CREDIT
		ESC	3	0	0	3

Course Prerequisite / Preamble

- Basic understanding of computers, logical reasoning, and programming fundamentals.
- This course provides the foundation for developing problem-solving skills and programming applications using Python.

Course Objective

- Understand the fundamentals of Python programming, including syntax, data types, operators, and input/output operations.
- Develop problem-solving skills using decision-making constructs, looping statements, and control structures in Python.
- Design and implement reusable programs using functions, modules, packages, and standard Python libraries.
- Apply Python data structures and file handling techniques to store, process, and manage data effectively.
- Develop object-oriented Python applications using classes, objects, inheritance, polymorphism, encapsulation, and other OOP concepts.

Course Outcome

- To understand the fundamentals of Python programming language.
- To apply decision-making and looping concepts in problem solving.
- To develop modular programming skills using functions and modules.
- To learn Python data structures and file handling techniques.
- To implement object-oriented programming concepts using Python.

Syllabus

Unit 1	**Introduction To Python**	**(9)**
Introduction to Python – Features of Python – Installation and execution – Variables and data types – Input and output statements – Operators and expressions – Type conversion – Python programming examples.		
Unit 2	**Decision Making and Looping**	**(9)**
Conditional statements – if, if-else, nested if – Looping statements – for loop, while loop – break, continue, pass statements – Pattern generation – Problem solving using loops.		
Unit 3	**Functions And Modules**	**(9)**
Functions – Function arguments – Return values – Lambda functions – Recursive functions – Modules and packages – Import statements – Python standard libraries.		
Unit 4	**Data Structures and File Handling**	**(9)**

Strings – Lists – Tuples – Dictionaries – Sets – File operations – Reading and writing files – Exception handling – Applications using data structures and files.		
Unit 5	**Object Oriented Programming in Python**	**(9)**
Classes and objects – Constructors – Inheritance – Polymorphism – Encapsulation – Method overloading and overriding – Simple applications using Python.		

Total Hours: 45

Text Books

1. Reema Thareja, Python Programming using Problem Solving Approach, Oxford University Press, 3rd Edition (2025).
2. Y. Daniel Liang, Introduction to Programming using Python, Pearson Education, 3rd Edition.
3. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Publications, 1st Edition.

Reference

1. Mark Lutz, Learning Python, O'Reilly Publications.
2. Allen B. Downey, Think Python, Green Tea Press.
3. Kenneth A. Lambert, Fundamentals of Python, Cengage Learning.

Web / NPTEL Resources:

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs109
2. https://nptel.ac.in/courses/106106182
3. https://nptel.ac.in/courses/115104095

CO PO Mapping

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

Assessment Methodology

Assessment Methodology	**Assessment Tools**	**Marks**
Internal Test I	Written Examination	10
Internal Test II	Written Examination	10
Internal Test III	Written Examination	10
Assessment	Assignment	05
Attendance	Performance	05
Total		40

ITT26104	IT ESSENTIALS	CATEGORY	L	T	P	CREDIT
		ESC	3	0	0	3

Course Prerequisite / Preamble
● Basic mathematics and logical reasoning. ● This course aims to build foundational literacy in computer hardware, software, networking and mobile communication concepts. ● It develops awareness of information security practices and introduces emerging IT technologies shaping the digital world.
Course Objective
● To understand the fundamentals of computer organization, architecture and number systems. ● To introduce the basics of computer networks, the Internet and the World Wide Web. ● To explain the working principles and architecture of mobile/cellular communication systems. ● To create awareness of information security concepts, threats and protective practices. ● To familiarize learners with emerging IT technologies and their responsible use.

Course Outcome		
CO1	Explain the types, applications and organization of computers, including CPU, memory, storage and number systems.	K2
CO2	Describe computer networks, network devices, the OSI/TCP-IP models, IP addressing and Internet fundamentals.	K2
CO3	Summarize the working principles, architecture and generations of mobile/cellular communication systems.	K2
CO4	Apply information security fundamentals such as the CIA triad, authentication, encryption and safe browsing practices.	K3
CO5	Outline emerging IT technologies including cloud computing, IoT, AI/Generative AI, big data and blockchain.	K2

Syllabus		
Unit 1	**Computer Fundamentals**	9
	Types of Computers -- Applications of Computers -- Computer Organization and Architecture: basics -- CPU, ALU, Control Unit, Registers -- Memory: RAM, ROM, Cache -- Secondary Storage -- Input and Output Devices -- Number Systems: Binary, Decimal, Octal and Hexadecimal -- Data Representation.	
Unit 2	**Networking & Internet**	9
	Computer networks -- LAN/MAN/WAN -- network devices -- topologies -- OSI and	

	TCP/IP models -- IP addressing -- DNS, DHCP -- routers and switches -- Internet and WWW -- browsers -- email -- basic troubleshooting.	
Unit 3	**Mobile Communication Essentials**	9
	Cell phone working fundamentals -- cell phone frequencies and channels -- digital cell phone components -- generations of cellular networks -- cell phone network technologies/architecture -- voice calls and SMS.	
Unit 4	**Information Security**	9
	Fundamentals of information security -- CIA triad -- authentication and authorization -- passwords and MFA -- malware, phishing, social engineering -- firewalls, antivirus -- encryption basics -- safe browsing -- data privacy -- cyber ethics.	
Unit 5	**Emerging IT Technologies**	9
	Cloud computing -- virtualization -- IoT -- Artificial Intelligence and Generative AI -- Big Data -- blockchain basics -- mobile computing -- edge computing -- digital transformation -- responsible use of AI.	

Text Books

1. Rajaraman, V., Introduction to Information Technology, 3rd Edition, PHI Learning, 2018.
2. Forouzan, B.A., Data Communications and Networking, 5th Edition, McGraw-Hill, 2013.

Reference

1. Sinha, P.K. and Sinha, P., Computer Fundamentals, 6th Edition, BPB Publications, 2016.
2. Tanenbaum, A.S. and Wetherall, D., Computer Networks, 5th Edition, Pearson, 2011.
3. Schiller, J., Mobile Communications, 2nd Edition, Pearson, 2009.
4. Stallings, W., Computer Security: Principles and Practice, 4th Edition, Pearson, 2018.
5. Rittinghouse, J.W. and Ransome, J.F., Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

Web / NPTEL Resources

1. NPTEL -- IIT Madras: Problem Solving through Programming / IT Fundamentals.
2. SWAYAM -- Computer Networks (IIT Kharagpur).
3. NPTEL -- Cyber Security and Privacy.

CO-PO Mapping

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

CO4	3	2	2	-	2	-	-	-	-	-	-	-	-
CO5	3	2	2	-	2	-	-	-	-	-	-	-	-

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Continuous Internal Assessment	Assignment / Tutorial	10
Internal Test I	Written Examination	05
Internal Test II	Written Examination	05
Model Examination	Written Examination	10
Attendance	Performance	10
Total		40

BOT26105	BIOLOGY FOR COMPUTER ENGINEERS	CATEGORY	L	T	P	CREDIT
		BSC	3	0	0	3

Course Prerequisite / Preamble

- Basic understanding of Biology concepts studied at Higher Secondary level.
- This course provides the foundation for understanding biological systems and their engineering applications in biotechnology, healthcare, environment, and sustainable technologies.

Course Objective

- To introduce the fundamental concepts of biology relevant to engineering applications.
- To understand the structure and functions of cells and biomolecules.
- To familiarize students with genetics, biotechnology, and bioengineering concepts.
- To provide knowledge on biological processes and their industrial applications.
- To create awareness about environmental sustainability and biomedical innovations.

Course Outcome

CO1	Understand the structure and functions of cells and biomolecules.	**K2**
CO2	Explain biological processes and metabolic pathways relevant to engineering.	**K2**
CO3	Apply genetics and biotechnology concepts in engineering applications.	**K3**
CO4	Analyse environmental and biomedical applications of biology.	**K4**
CO5	Interpret the role of biological systems in sustainable engineering solutions	**K5**

Syllabus

Unit I	**Cell Biology**	**(9)**

Introduction to Biology – Cell as basic unit of life – Prokaryotic and eukaryotic cells – Cell structure and functions – Cell membrane – Nucleus – Mitochondria – Chloroplast – Cell division – Mitosis and meiosis – Applications in engineering and biotechnology.

Unit II	**Biomolecules and Enzymes**	**(9)**

Structure and functions of carbohydrates, proteins, lipids, and nucleic acids – DNA and RNA – Enzymes – Classification and mechanism of enzyme action – Factors affecting enzyme activity – Industrial and biomedical applications of enzymes.

Unit III	**Genetics and Biotechnology**	**(9)**

Principles of genetics – Mendel's laws – Chromosomes and genes – Genetic engineering – Recombinant DNA technology – Polymerase Chain Reaction (PCR) – Cloning – Applications of biotechnology in medicine, agriculture, and industry.		
Unit IV	**Microbiology and Environmental Biology**	**(9)**
Introduction to microorganisms – Bacteria, fungi, and viruses – Microbial growth – Industrial microbiology – Waste management – Bioremediation – Environmental pollution and control – Sustainable environmental practices.		
Unit V	**Bioengineering and Biomedical Applications**	**(9)**
Introduction to bioengineering – Tissue engineering – Biosensors – Biomedical devices – Artificial organs – Bioinformatics – Applications of biology in healthcare engineering – Ethical issues in biotechnology and biomedical engineering.		

Total Hours: 45

Text Books

1. T. Johnson, Biology for Engineers, CRC Press, 2nd Edition (2018).
2. Campbell Biology, by Campbell & Reece, now continued by Urry, Minorsky, Hull, and Orr, Pearson Education, 13th Edition.
3. U. Satyanarayana, Biotechnology, Books and Allied Publications, 3rd Edition (2020).

Reference

1. Lehninger, Principles of Biochemistry, W.H. Freeman Publications.
2. Prescott, Microbiology, McGraw Hill Education.
3. B.D. Singh, Biotechnology, Kalyani Publishers.
4. Gerard J. Tortora, Principles of Anatomy and Physiology, Wiley Publications.

Web / NPTEL Resources

1. https://nptel.ac.in/courses/121106008
2. https://nptel.ac.in/courses/102106081

CO-PO Mapping

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

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Internal Test I	Written Examination	10
Internal Test II	Written Examination	10
Internal Test III	Written Examination	10
Assessment	Assignment	05
Attendance	Performance	05
Total		40

ITL26101	PYTHON PROGRAMMING LAB	CATEGORY	L	T	P	CREDIT
		ESC	0	0	3	1.5

Course Prerequisite / Preamble
• Basic programming language concepts and logic building. • This laboratory course introduces students to problem solving using Python programming language. • The course emphasizes hands-on programming skills through real-life, scientific, and technical applications. • Students gain knowledge in Python syntax, control structures, functions, file handling, exception handling, modules, libraries, and game development using Pygame. • The course enables students to develop logical thinking, computational skills, and programming proficiency for engineering applications.
Course Objective
• To develop applications using Python programming concepts and standard libraries. • To develop problem-solving ability using conditional statements and iterative loops. • To implement functions, strings, modules, and file handling techniques in Python. • To demonstrate exception handling and real-time programming applications. • To explore Pygame tool for developing interactive gaming applications.

Course Outcome		
CO1	Develop applications for simple real-life problems using Python.	K3
CO2	Write programs using Python statements, expressions, conditionals, and iterative loops.	K3
CO3	Write programs by implementing functions, strings, and Python standard libraries.	K3
CO4	Demonstrate applications by dealing with exceptions and file handling.	K4
CO5	Explore Pygame tool by developing an interactive gaming application.	K5

Exp. No.	Title	Description / Problem Statements	CO
Ex.1	Real-Life / Scientific / Technical Problems	Identification and solving of simple real-life or scientific or technical problems – Electricity Billing, Retail Shop Billing, Sin Series, etc.	CO1
Ex.2	Simple Statements and Expressions	Python programming using simple statements and expressions – exchange values of two variables, circulate values of n variables, distance between two points.	CO2

Ex.3	Conditionals and Iterative Loops	Scientific problems using conditionals and iterative loops – Number Series, Number Patterns, Pyramid Pattern.	CO2
Ex.4	Lists and Tuples	Implementing real-time / technical applications using Lists and Tuples.	CO2
Ex.5	Sets and Dictionaries	Implementing real-time / technical applications using Sets and Dictionaries – language components, automobile elements, civil structure elements; operations of Sets & Dictionaries.	CO2
Ex.6	Functions	Implementing programs using Functions – Factorial, largest number in a list, area of shapes.	CO3
Ex.7	Strings	Implementing programs using Strings – reverse, palindrome check, character count, replacing characters.	CO3
Ex.8	Modules and Python Standard Libraries	Implementing programs using written modules and Python Standard Libraries – Pandas, NumPy, Matplotlib, SciPy.	CO3
Ex.9	File Handling	Implementing real-time / technical applications using File Handling – copy from one file to another, word count, longest word.	CO4
Ex.10	Exception Handling	Implementing real-time / technical applications using Exception Handling – divide by zero error, voter's age validity, student mark range validation.	CO4
Ex.11	Pygame –Gaming Application	Exploring Pygame tool; developing a game activity using Pygame – bouncing ball, car race, etc.	CO5

Total Hours : 45

Text Books

1. Allen B. Downey, *Think Python: How to Think Like a Computer Scientist*, 2nd Edition, O'Reilly Media, 2015.
2. Mark Lutz, *Learning Python*, 5th Edition, O'Reilly Media, 2013.
3. Wesley J. Chun, *Core Python Applications Programming*, 3rd Edition, Prentice Hall, 2012.

Reference

1. Guido van Rossum, Python Reference Manual – https://docs.python.org/3/
2. Bill Lubanovic, Introducing Python: Modern Computing in Simple Packages, O'Reilly Media, 2019.
3. Wes McKinney, Python for Data Analysis, 3rd Edition, O'Reilly Media, 2022.

Web / NPTEL Resources

1. NPTEL – Programming, Data Structures and Algorithms using Python, IIT Madras: https://nptel.ac.in/courses/106106145
2. Python Official Documentation & Tutorials: https://docs.python.org/3/tutorial/
3. Pygame Official Documentation: https://www.pygame.org/docs/

CO PO Mapping													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	2	1	-	1	-	-	2	1	-	3	2
CO2	3	3	2	1	-	-	-	-	2	-	-	3	2
CO3	3	3	2	2	-	-	-	-	2	1	-	3	3
CO4	3	2	2	3	1	-	-	-	1	1	-	3	2
CO5	2	2	3	2	2	1	-	-	2	1	-	3	2

Assessment Methodology	**Assessment Tools**	**Marks**
Objective	Observation	10
Record Work		10
Model Exam		15
Virtual Lab Assignment / Online Coding Assessment	Review	10
Model Creation	Presentation	05
Attendance		10
Total		60

MEL26102	ENGINEERING WORKSHOP LABORATORY	CATEGORY	L	T	P	CREDIT
		ESC	0	0	3	1.5

Course Prerequisite / Preamble
• This laboratory course provides practical exposure to basic manufacturing and workshop practices used in engineering applications. • Students gain hands-on training in fitting, welding, carpentry, sheet metal, and lathe operations with emphasis on safety and skill development.
Course Objective
• To familiarize students with common workshop tools and equipment. • To develop practical skills in fitting, welding, carpentry, sheet metal, and lathe operations. • To train students in safe handling of workshop machines and materials. • To enhance fabrication and assembly skills through practical exercises. • To provide exposure to basic manufacturing processes and engineering practices.

Course Outcome		
CO1	Identify and use workshop tools and measuring instruments safely.	**K3**
CO2	Perform fitting and carpentry operations for simple engineering jobs.	**K3**
CO3	Carry out basic welding and sheet metal fabrication operations	**K3**
CO4	Operate basic lathe machines for simple machining processes.	**K3**
CO5	Demonstrate teamwork, safety practices, and professional ethics in workshop environments.	**K4**

FITTING SHOP
1. Introduction to fitting tools and safety practices.
2. Marking, sawing, filing, and drilling operations.
3. Preparation of fitting joints and assemblies.
4. Inspection and finishing operations.

WELDING SHOP
1. Introduction to welding equipment and safety precautions.
2. Arc welding practice on mild steel plates.
3. Preparation of lap joint and butt joint.
4. Finishing and inspection of welded joints.

CARPENTRY SHOP
1. Introduction to carpentry tools and wood working practices.
2. Marking, cutting, planning, and chiselling operations.
3. Preparation of wooden joints.
4. Finishing and inspection of carpentry work.

SHEET METAL SHOP
1. Introduction to sheet metal tools and safety procedures.
2. Sheet metal cutting, bending, and folding operations.
3. Preparation of simple sheet metal models.
4. Riveting and finishing operations.

LATHE SHOP
1. Introduction to lathe machine and machining safety.
2. Facing and turning operations.
3. Knurling, drilling, and threading operations.
4. Inspection and finishing operations.

Total Hours : 45

Text Books
1. Choudhury, Hajra, et al. Workshop Technology Vol. I & II. Media Promoters and Publishers, 2012.
2. Rao, P. N. Manufacturing Technology. 5th ed., McGraw-Hill, 2019.
3. John, K. C. Mechanical Workshop Practice. 2nd ed., PHI Learning, 2010.
Reference
1. Choudhury, S. K. Hajra, et al. Elements of Workshop Technology. 15th ed., Media Promoters, 2012.
2. Raghuwanshi, B. S. A Course in Workshop Technology. 10th rev. ed., Dhanpat Rai and Company, 2009.
3. Chapman, W. A. J. Workshop Technology. 4th ed., Edward Arnold Publications, 1972.

Web / NPTEL Resources
1. https://nptel.ac.in/courses/112107145
2. https://nptel.ac.in/courses/112104224
3. https://www.vlab.co.in/
4. https://onlinecourses.nptel.ac.in/

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

Assessment Methodology	Assessment Tools	Marks
Regular Laboratory Conduction	Observation	10
Record Work		10
Model Exam		15
Virtual Lab Assignment / Online Coding Assessment	Review	10
Model Creation	Presentation	05
Attendance		10
Total		60

DTL26103	DESIGN THINKING AND IDEA LABORATORY	CATEGORY	L	T	P	CREDIT
		ESC	0	0	3	1.5

Course Prerequisite / Preamble

- This laboratory introduces students to the basic steps of Design Thinking and simple idea development.
- Students gain hands-on practice in identifying problems, generating ideas, making simple prototypes, testing solutions, and presenting results.

Course Objective

- To understand the basic principles and stages of Design Thinking.
- To identify user needs and define simple engineering or societal problems.
- To generate and select useful ideas using simple ideation methods.
- To develop and test basic prototypes or models.
- To improve teamwork, communication, and presentation skills.

Course Outcome

CO1	Understand the principles and stages of design thinking.	**K2**
CO2	Identify user needs and define simple problems using basic design tools.	**K3**
CO3	Generate and select suitable ideas using simple ideation techniques.	**K4**
CO4	Develop and test a basic prototype for a selected problem.	**K4**
CO5	Demonstrate teamwork, communication, and presentation skills through an idea-based project.	**K4**

1. Introduction to design thinking and innovation process.
2. Observation, empathy, and user needs – simple empathy map.
3. Problem identification and problem statement.
4. Brainstorming and mind mapping for idea generation.
5. Idea screening and selection based on usefulness and feasibility
6. Concept sketching and simple solution planning.
7. Low-cost prototype development using paper, cardboard, foam, or simple digital models.
8. Prototype testing and collection of user feedback.
9. Iteration and improvement of the prototype.
10. Select an engineering or societal problem and prepare an idea proposal.
11. Develop and document a simple model or demonstration prototype.
12. Demonstrate the project and present the outcome with viva voce.
13. Simple product improvement and sustainable idea development

14.	Idea communication using poster, pitch, or storyboard.
15.	Final presentation and peer evaluation.

Total Hours : 45

Text Books

1. Tim Brown, Change by Design, Harper Business Publications, (2019).
2. Vijay Kumar, 101 Design Methods, Wiley Publications, 1st Edition (2012).
3. Idris Mootee, Design Thinking for Strategic Innovation, Wiley Publications, 1st Edition (2013).

Reference

1. Thiel, Peter, and Blake Masters. Zero to One: Notes on Start-ups, or How to Build the Future. 1st ed., Crown Business, 2014.
2. Christensen, Clayton M. The Innovator's Dilemma, with a New Foreword: When New Technologies Cause Great Firms to Fail. Harvard Business Review Press, 2024.
3. Brown, Tim, and Barry Katz. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. Revised and updated ed., Harper Business, 2019

Web / NPTEL Resources

1. https://nptel.ac.in/courses/110106124
2. https://www.ideou.com/
3. https://www.interaction-design.org/

CO-PO Mapping

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

Assessment Methodology	Assessment Tools	Marks
Regular Laboratory Conduction	Observation	10
Record Work		10
Model Exam		15
Virtual Lab Assignment / Online Coding Assessment	Review	10
Model Creation	Presentation	05
Attendance		10
Total		60

CDC26101	CAREER DEVELOPMENT SKILL-I	CATEGORY	L	T	P	CREDIT
		CDS	0	0	2	1

Course Prerequisite / Preamble
• Basic understanding of English communication and grammar. • Interest in developing aptitude and reasoning skills. • Willingness to participate in communication and personality development activities.
Course Objective
• To improve communication and interpersonal skills. • To develop aptitude and logical reasoning abilities. • To enhance confidence and professional skills.

Course Outcome		
CO1	Develop effective verbal and non-verbal communication skills for academic and professional environments.	K2
CO2	Apply basic quantitative aptitude concepts to solve numerical and logical problems efficiently.	K2
CO3	Demonstrate improved vocabulary, grammar, and sentence construction skills for professional communication.	K2
CO4	Analyze and solve basic reasoning and analytical problems using logical thinking techniques.	K3
CO5	Exhibit positive attitude, teamwork, confidence, and time management skills for personal and career development.	K2

Syllabus		
Unit 1	**Communication Fundamentals**	**(6)**
Basics of Communication, Verbal and Non-Verbal Communication, Listening Skills, Introduction to Public Speaking, Self Introduction Techniques, and Professional Etiquette.		
Unit 2	**Vocabulary Development**	**(6)**
Synonyms & Antonyms, Word Formation, Commonly Confused Words, One Word Substitution, Sentence Construction, and Basic Grammar Usage.		
Unit 3	**Quantitative Aptitude – Basics**	**(6)**
Number System, Simplification, HCF & LCM, Percentages, Ratio & Proportion, and Average Problems.		

Unit 4	Logical Reasoning – Introduction	(6)
Coding & Decoding, Series Completion, Blood Relations, Direction Sense Test, Odd One Out, and Basic Analytical Thinking.		
Unit 5	**Personality Development**	**(6)**
Goal Setting, Positive Attitude, Confidence Building, Time Management, Team Work Activities, and Stress Management Basics.		

Total Hours : 30

Text Books

1. Aggarwal, R. S. Quantitative Aptitude for Competitive Examinations. S. Chand Publishing, 2024.
2. Mitra, Barun K. Personality Development and Soft Skills. 2nd ed., Oxford University Press, 2022.
3. Dhanavel, S. P. English and Soft Skills. Orient BlackSwan, 2010

Reference

1. Lewis, Norman. Word Power Made Easy. Goyal Publishers, 2012.
2. Tyra, M. Magical Book on Quicker Maths. 5th rev. ed., BSC Publishing, 2018.
3. Carnegie, Dale. How to Win Friends and Influence People. Simon & Schuster, 2009.

CO PO Mapping

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

Assessment Methodology

Assessment Methodology	Assessment Tools	Marks
Continuous Internal Assessment	Observation / Record Work / Viva Voce	30
Internal Practical Examination	Laboratory Performance	30
End Semester Practical Examination	Experiment and Viva Voce	40
	Total	100

PEC26101	PHYSICAL EDUCATION AND TRAINING	CATEGORY	L	T	P	CREDIT
		-	0	0	1	-

Course Prerequisite / Preamble
• This course focuses on physical fitness, sports participation, health awareness, and personality development through regular physical education and training activities. Students gain practical exposure to physical exercises, fitness training, sports skills, recreational activities, and wellness practices that contribute to overall physical and mental well-being. • The course promotes discipline, teamwork, leadership, sportsmanship, and healthy lifestyle habits.
Course Objective
• To promote physical fitness and healthy lifestyle practices among students. • To develop interest and participation in sports and physical activities. • To improve physical endurance, flexibility, coordination, and mental fitness. • To encourage teamwork, discipline, leadership, and sportsmanship qualities. • To create awareness about health, nutrition, and wellness practices.

Course Outcome		
CO1	Understand the importance of physical fitness, sports, and healthy lifestyle practices.	K2
CO2	Perform basic physical exercises and fitness activities effectively.	K3
CO3	Demonstrate participation in sports and recreational activities with discipline and teamwork.	K2
CO4	Apply health, hygiene, nutrition, and wellness practices for physical well-being.	K4
CO5	Develop leadership qualities, sportsmanship, and positive attitude through physical education activities.	K3

LIST OF ACTIVITIES
1. Introduction to physical fitness, health awareness, and importance of physical education. 2. Warm-up exercises, stretching, and flexibility training.

3. Physical fitness exercises for endurance, strength, and coordination.
4. Practice sessions in athletics – running, relay, jumping, and basic field events.
5. Training in indoor and outdoor sports activities.
6. Team games and recreational activities for teamwork and leadership development.
7. Yoga, breathing exercises, and relaxation techniques for mental wellness.
8. Awareness programme on nutrition, hygiene, and healthy lifestyle practices.
9. Participation in sports events, fitness competitions, and physical training drills.
10. Physical fitness assessment, activity record submission, and performance evaluation.

GUIDELINES

1. Students shall actively participate in all physical education and sports activities.
2. Proper sports attire and discipline shall be maintained during training sessions.
3. Students shall follow safety measures and instructor guidelines during physical activities.
4. Participation in fitness assessments, sports events, and wellness programmes is mandatory.
5. Students shall maintain an activity record / fitness logbook throughout the course.
6. Attendance and regular participation are essential for successful completion of the course.

Reference

1. Physical Education and Sports Training Manuals.
2. Ministry of Youth Affairs and Sports – Fitness Guidelines.
3. Yoga and Wellness Practice Handbooks.
4. Health and Nutrition Awareness Materials.

Web / NPTEL Resources

1. https://yas.nic.in/
2. https://fitindia.gov.in/
3. https://nptel.ac.in/
4. https://www.who.int/health-topics/physical-activity

CO PO Mapping

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

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Participation and Performance	Physical Activities / Sports Participation / Fitness Training	40
Physical Fitness Evaluation	Endurance, Flexibility, and Skill Assessment	30
Activity Record / Fitness	Logbook Documentation and Reflection	20
Discipline and Attendance	Regularity, Conduct, and Team Participation	10
	Total	100

*Slightly it can be varied based on the requirement, necessity and weightage

SEMESTER – II

MAC26201	PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS	CATEGORY	L	T	P	CREDIT
		BSC	3	1	0	4

Course Prerequisite / Preamble

- Basic knowledge of Engineering Mathematics – I, calculus, differential equations, and complex numbers.
- Understanding of integration, matrices, and elementary transforms.
- This course is designed to provide students with mathematical tools required for solving engineering problems involving complex variables, Laplace transforms, inverse Laplace transforms, and Fourier transforms. The course develops analytical and problem-solving skills for applications in engineering systems, signal processing, heat transfer, fluid mechanics, and control systems.

Course Objective

- To formulate and solve problems involving analytic functions and conformal mappings.
- To understand and apply Taylor and Laurent series expansions for complex functions.
- To understand Laplace transforms and their properties.
- To apply Laplace transforms in solving ordinary differential equations and simultaneous differential equations.
- To understand and apply Fourier transform techniques and their engineering applications.

Course Outcome

CO1	Apply the concepts of analytic functions, Cauchy–Riemann equations, harmonic functions, and construction of analytic functions in solving complex variable problems.	K3
CO2	Analyze conformal and bilinear transformations, perform Taylor and Laurent series expansions, and classify singularities of complex functions.	K4
CO3	Understand the Laplace transform and its properties for engineering applications.	K3
CO4	Apply Laplace transforms to solve ordinary differential equations with constant coefficients and simultaneous ordinary differential equations.	K4
CO5	Understand and apply Fourier transform techniques including Fourier integral theorem, convolution, and Parseval's identity.	K4

Syllabus		
UNIT I	**Derivatives**	**(12)**
Continuity, derivative and analytic functions – Necessary conditions – Cauchy Riemann equations (Cartesian and polar form) and sufficient conditions (excluding proof) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions.		
UNIT II	**Complex Functions**	**(12)**
Conformal mapping – Simple and standard transformations like $w = z + c$, cz, z^2, e^z, $\sin z$, $\cosh z$ and $z + \frac{1}{z}$ – Bilinear transformation and cross ratio property (excluding Schwarz-Christoffel transformation). Taylor's and Laurent's theorem (without proof) – Series expansion of complex valued functions – Classification of singularities.		
UNIT III	**Transformations**	**(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 – properties – convolution theorem – application to solution of ordinary differential equations with constant coefficients and simultaneous ordinary differential equations.		
UNIT IV	**Fourier**	**(12)**
Fourier Integral theorem (statement only) – Fourier transform and its inverse – Fourier sine and cosine transforms – properties of Fourier transforms – convolution and Parseval's identity.		
UNIT V	**Laplace**	**(12)**
Applications of Laplace and Fourier transforms in engineering problems – heat transfer analysis – vibration systems – electrical circuits – signal processing – boundary value problems.		

Total Hours: 60

Text Books

1. Veerarajan T., *Engineering Mathematics for First Year*, Tata McGraw Hill, 2010.

2. Venkataraman M.K., *Engineering Mathematics, Vol. II & III*, National Publishing Company, Chennai, 2012.

3. B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, Delhi, 2007.

Reference

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, 7th Edition, Wiley India, 2007.

2. Bali N.P. and Manish Goyal, *Text Book of Engineering Mathematics*, 3rd Edition, Laxmi Publications Pvt. Ltd., 2008.

3. Grewal B.S., *Higher Engineering Mathematics*, 40th Edition, Khanna Publishers, Delhi, 2007.

Web / NPTEL Resources
1. NPTEL – Advanced Engineering Mathematics: https://nptel.ac.in
2. MIT OpenCourseWare – Differential Equations and Linear Algebra: https://ocw.mit.edu
3. Khan Academy – Laplace and Fourier Transforms: https://www.khanacademy.org

CO PO Mapping													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	2	1
CO2	3	3	-	1	-	-	-	-	-	-	-	2	1
CO3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	1	-	-	-	-	-	-	-	2	1
CO5	3	3	2	2	-	-	-	-	-	-	-	2	2

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Continuous Internal Assessment	Assignment / Tutorial	10
Internal Test I	Written Examination	05
Internal Test II	Written Examination	05
Model Examination	Written Examination	10
Attendance	Performance	10
Total		40

ENC26202	TECHNICAL ENGLISH AND COMMUNICATION	CATEGORY	L	T	P	CREDIT
		BSC	3	0	0	3

Course Prerequisite / Preamble

- Enhances communication skills for academic and professional environments.
- Develops LSRW skills for engineering students.
- Focuses on technical, interpersonal, and employability communication skills.

Course Objective

- To develop effective LSRW skills for academic and professional communication.
- To enhance technical and workplace communication skills.
- To improve employability and professional communication practices.

Course Outcome		
CO1	Apply effective communication principles in academic and professional contexts	K3
CO2	Demonstrate reading comprehension and analytical skills using technical materials	K3
CO3	Prepare structured technical and professional documents	K4
CO4	Demonstrate oral communication skills through presentations, discussions, and interviews	K3
CO5	Use grammar, vocabulary, and workplace communication effectively in engineering contexts	K3

Syllabus		
Unit 1	**Fundamentals Of Technical Communication**	**(9)**
Introduction to Communication – Process of Communication – Verbal and Non-verbal Communication – Barriers to Communication – Principles of Effective Communication – Seven C's of Communication – Technical Communication in Engineering – Formal and Informal Communication – Digital Communication Etiquette – Listening Skills – Reading Skills.		
Unit 2	**Reading And Language Development**	**(9)**
Reading Techniques – Skimming – Scanning – Intensive and Extensive Reading – Reading Technical Articles, Manuals and Reports – Vocabulary Building – Root Words – Prefixes and Suffixes – Synonyms and Antonyms – Homophones and Homonyms – One-word Substitutes – Abbreviations and Acronyms – Contextual Meaning.		
Unit 3	**Professional Writing Skills**	**(9)**

Sentence Structures – Paragraph Development – Coherence and Cohesion – Technical Description – Process Writing – Email Writing – Business Letters – Memorandum – Meeting Minutes – Resume Writing – Report Writing – Essay Writing – Instructions and Recommendations.		
Unit 4	**Oral Communication and Presentation Skills**	**(9)**
Phonetics and Pronunciation – Stress and Intonation – Public Speaking – JAM Sessions – Group Discussions – Debates – Role Plays – Technical Presentations – Presentation Tools and Visual Aids – Interview Skills – Corporate Communication Etiquette.		
Unit 5	**Workplace Communication and Employability Skills**	**(9)**
Grammar for Professional Communication – Subject Verb Agreement – Articles and Prepositions – Error Correction – Punctuation – Common Workplace Errors – Indianisms – Cross-cultural Communication – Communication in Teams – Workplace Ethics – Communication for Innovation and Entrepreneurship – AI-assisted Communication Tools.		

Total Hours: 45

Text Books:

- Technical Communication: English Skills for Engineers Meenakshi Raman & Sangeeta Sharma, Oxford University Press, New Delhi, 2nd Edition, 2009.
- Effective Technical Communication, M. Ashraf Rizvi, McGraw Hill Education, New Delhi, 2nd Edition, 2017.
- Business Communication Today, Courtland L. Bovee & John V. Thill, Pearson Education, 14th Edition, 2018.
- Communicative English for Engineers and Professionals, Nitin Bhatnagar & Mamta Bhatnagar, Pearson Longman, 2009.

Reference:

- Practical English Usage, Michael Swan, Oxford University Press, 4th Edition, 2016.
- Advanced Grammar in Use, Martin Hewings, Cambridge University Press, 3rd Edition, 2013.
- The Elements of Style, William Strunk Jr. & E.B. White, Pearson Education, 4th Edition, 2000.

Web / NPTEL Resources:

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_hs34
2. https://onlinecourses.nptel.ac.in/e-learning/preview/noc19_hs33
3. https://onlinecourses.nptel.ac.in/e-learning

CO PO Mapping													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	1	1	-	-	-	2	-	1	2	3	-	1	-
CO2	1	2	-	1	-	-	-	-	1	3	-	1	1
CO3	1	2	1	-	1	-	-	1	2	3	-	2	1
CO4	-	-	-	-	-	1	-	1	3	3	-	1	2
CO5	1	1	-	-	1	2	-	2	2	3	1	1	1

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Continuous Internal Assessment	Assignment / Tutorial	10
Internal Test I	Written Examination	05
Internal Test II	Written Examination	05
Model Examination	Written Examination	10
Attendance	Performance	10
Total		40

EEC26203	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	CATEGORY	L	T	P	CREDIT
		ESC	3	0	0	3

Course Prerequisite / Preamble

- Introduce the fundamentals of electrical circuits and basic electrical quantities.
- Provide basic knowledge of DC, AC and magnetic circuits.
- Develop understanding of electrical wiring, safety, protection and earthing.
- Introduce semiconductor devices and basic electronic circuits.
- Provide fundamental knowledge of digital electronics and operational amplifiers.

Course Objective

- Introduce the basic concepts of electrical circuits, DC and AC circuits, and magnetic circuits.
- Develop fundamental knowledge of electrical wiring, safety practices, protection devices and earthing.
- Introduce the operating principles and basic applications of semiconductor electronic devices.
- Provide fundamental knowledge of digital electronics, logic gates and basic digital circuits.
- Introduce the basic concepts and applications of operational amplifiers.

Course Outcome

CO1	Apply basic laws and principles to analyze simple DC and magnetic circuits.	**K2**
CO2	Analyze basic AC circuits and determine voltage, current, power and power factor.	**K3**
CO3	Explain basic electrical wiring, safety practices, protection devices, cables and earthing.	**K2**
CO4	Explain the working principles and basic applications of semiconductor devices such as diodes, transistors, JFET and MOSFET.	**K2**
CO5	Apply basic concepts of logic gates, digital circuits and operational amplifiers to simple electronic applications.	**K3**

Syllabus		
Unit 1	**DC AND MAGNETIC CIRCUITS**	**9 hours**
Voltage, current, power and energy - Basic electrical circuits - Ohm's law - Kirchhoff's laws - Series and parallel circuits - Voltage and current division - Basic network analysis - Magnetic circuits - Magnetic materials - Electromagnetic induction - Faraday's law - Lenz's law - Self and mutual induction.		
Unit 2	**AC CIRCUITS**	**9 hours**
AC fundamentals – AC waveform– RMS and average values – R, L, and C circuits – Phasors – Impedance -AC power – Power factor- Single-phase and three-phase circuits – Star and Delta connections – Line and phase values		
Unit 3	**ELECTRICAL WIRING AND SAFETY**	**9 hours**
Electrical safety - Electrical tools - Wiring types - Domestic wiring - Basic lighting circuits - Fuses and circuit breakers - Electrical shock and protection - Industrial wiring - Cables and conductors - Earthing - Electrical installation - Basic energy audit and ECAD.		
Unit 4	**BASIC ELECTRONIC DEVICES**	**9 hours**
Semiconductors – PN Junction Diode – Forward and Reverse Bias – Zener Diode – LED – Photodiode – Basic Rectifiers – BJT: NPN and PNP – JFET and MOSFET – Basic Applications.		
Unit 5	**DIGITAL ELECTRONICS AND OP-AMP**	**9 hours**
Basic Number Systems – Logic Gates – Boolean Algebra – Half Adder and Full Adder – Basic Flip-Flops – Counters – Shift Registers – Introduction to Op-Amp – Inverting and Non-Inverting Amplifiers – Integrator – Differentiator – Comparator.		

Total Hours: 45

Text Books:
1.D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, McGraw Hill Education, 4th Edition (2019). 2. S. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits, McGraw Hill Education, 4th Edition (2018).
Reference:
1. V. K. Mehta and Rohit Mehta, Principles of Electrical Engineering, S. Chand Publishing. 2. Thomas L. Floyd, Electronic Devices, Pearson Education. 3. M. Morris Mano, Digital Logic and Computer Design, Pearson Education. 4. ·R. P. Jain, Modern Digital Electronics, McGraw Hill Education.

Web / NPTEL Resources:
· NPTEL – Basic Electrical Engineering · NPTEL – Electrical Circuits · NPTEL – Basic Electronics · NPTEL – Digital Circuits · NPTEL – Analog Electronic Circuits

CO-PO Mapping

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

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Continuous Internal Assessment	Assignment / Tutorial	10
Internal Test I		05
Internal Test II		05
Model Examination	Review	10
Attendance		10
Total		40

PCT26204	PHYSICS AND CHEMISTRY FOR COMPUTER ENGINEER	CATEGORY	L	T	P	CREDIT
		HSM	3	0	0	3

Course Prerequisite / Preamble

- Basic knowledge of Physics and Chemistry at Higher Secondary level.
- Understanding of elementary concepts in materials science and electrochemistry.
- Foundation for engineering applications involving materials, optics, water treatment, and energy systems.

Course Objective

- To introduce the concepts of magnetic, dielectric, and superconducting materials used in engineering applications.
- To provide knowledge of quantum mechanics and wave nature of particles.
- To familiarize students with laser principles and optical fibre communication systems.
- To develop understanding of water treatment techniques and industrial water quality management.
- To impart knowledge of electrochemical cells, batteries, fuel cells, and corrosion control methods.

Course Outcome

CO1	Understand the properties and applications of magnetic, dielectric, and superconducting materials.	K2
CO2	Apply the principles of quantum mechanics and wave functions to engineering systems.	K3
CO3	Explain the principles and applications of lasers and optical fibre communication.	K2
CO4	Analyze water quality parameters and water treatment methods used in industries.	K2
CO5	Evaluate electrochemical cells, batteries, and fuel cells for engineering applications.	K2
CO6	Identify various types of corrosion and recommend suitable corrosion prevention methods.	K2

Syllabus

Unit 1	Magnetic, Dielectric and Superconducting Materials	9

Introduction to magnetic materials – Ferromagnetism – Domain theory – Types of energy – Hysteresis – Hard and soft magnetic materials – Ferrites – Dielectric materials – Types of polarization – Frequency effects on polarization – Dielectric breakdown – Ferroelectric materials – Superconducting materials and their properties – Applications in data storage, sensors and computing systems.

Unit 2	Quantum Physics and Quantum Computing Fundamentals	9

Introduction to Quantum Physics – Black body radiation – Planck's quantum theory – Photoelectric effect – Compton effect – Wave-particle duality – de Broglie hypothesis – Heisenberg uncertainty principle – Quantum states – Superposition principle – Quantum entanglement – Qubits – Quantum gates – Quantum circuits – Quantum algorithms – Introduction to quantum computing – Applications in Artificial
Intelligence, Machine Learning, Data Science and cryptography.

Unit 3	Lasers, Fiber Optics and Photonic Technologies	9

Lasers – Principles of laser action – Spontaneous and stimulated emission – Einstein coefficients – Population inversion – Components of laser – Types of lasers – Nd laser, CO_2 laser and semiconductor lasers – Fiber optics – Principle and propagation of light in optical fibres – Numerical aperture – Acceptance angle – Types of optical fibres – Photonic communication systems – Optical networks and data transmission.

Unit 4	Semiconductor Physics and Sensors	9

Energy bands in solids – Conductors, semiconductors and insulators – Intrinsic and extrinsic semiconductors – Carrier concentration – Drift and diffusion currents – p-n junction diode – LED and photodiode – Solar cell – Semiconductor devices used in computing systems – Sensors and transducers
– MEMS and smart sensors – Applications in IoT, AI and data acquisition systems.

Unit 5	Electrochemical Energy Systems and Advanced Materials	9

Electrochemical cells – Electrode potentials – Electrochemical series – Batteries: lead-acid, nickel-cadmium and lithium-ion batteries – Fuel cells and their applications – Energy storage technologies for data centres and AI hardware – Corrosion and its prevention – Nanomaterials: carbon nanotubes, graphene and quantum dots – Properties and applications in electronics, sensors and intelligent systems.

Total Hours: 45

Text Books

1. Gaur, R.K. and Gupta, S.L., *Engineering Physics*, Dhanpat Rai Publications, New Delhi, Latest Edition (2024).
2. Pandey, B.K. and Chaturvedi, S., *Engineering Physics*, Cengage Learning India, 2nd Edition (2022).
3. Arthur Beiser, *Concepts of Modern Physics*, McGraw-Hill Education, 7th Edition (2009).

   Serway, R.A. and Jewett, J.W., *Physics for Scientists and Engineers*, Cengage Learning, 11th Edition (2023).

Reference Books
1. Eisberg, R. and Resnick, R., *Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles*, Wiley India. 2. Nielsen, M.A. and Chuang, I.L., Quantum Computation and Quantum Information, Cambridge University Press. 3. Keiser, G., *Optical Fiber Communications*, McGraw-Hill Education. 4. Sze, S.M. and Ng, K.K., *Physics of Semiconductor Devices*, Wiley. 5. Kasap, S.O., *Principles of Electronic Materials and Devices*, McGraw-Hill Education.
Web / NPTEL Resources
1. https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016 2. https://www.coursera.org/learn/material-science-engineering 3. https://nptel.ac.in/courses/113105102 4. https://nptel.ac.in/courses/115106121

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

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Continuous Internal Assessment	Assignment / Tutorial	10
Internal Test I	Written Examination	05
Internal Test II	Written Examination	05
Model Examination	Written Examination	10
Attendance	Performance	10
Total		40

CST26205	PROGRAMMING IN C	CATEGORY	L	T	P	CREDIT
		ESC	3	0	0	3

Course Prerequisite / Preamble

- Basic knowledge of computer fundamentals and familiarity with the use of computers, operating systems, and common application software.
- Elementary mathematical and logical reasoning skills to understand problem-solving techniques, algorithms, and flowchart design.
- Interest in programming and computational thinking, providing a foundation for learning structured programming concepts using the C language.

Course Objective

- To introduce the fundamentals of computer systems, including hardware, software, operating systems, networking concepts, internet services, and office productivity tools.
- To develop problem-solving skills through algorithms, flowcharts, pseudo code, and program development methodologies.
- To impart knowledge of C programming fundamentals, including data types, operators, expressions, input/output operations, decision-making, and looping constructs.
- To enable students to design and develop C programs using arrays, functions, recursion, strings, structures, unions, and pointers.
- To provide practical knowledge of advanced C programming concepts, including file handling, command-line arguments, and preprocessor directives for developing efficient applications.

Course Outcome

CO1	Explain the fundamentals of computer systems, software, operating systems, networking concepts, internet services, and office productivity tools.	**K2**
CO2	Apply problem-solving techniques such as algorithms, flowcharts, and pseudo code to develop solutions for computational problems.	**K3**
CO3	Develop C programs using data types, operators, expressions, decision-making, and looping constructs.	**K3**

CO4	Implement modular programs using arrays, functions, recursion, strings, structures, unions, and pointers.	**K3**
CO5	Design and develop C applications incorporating file handling, command-line arguments, and preprocessor directives.	**K4**

Syllabus		
Unit 1	**History Of Computers**	**(9)**
History of Computers – Block diagram of a computer – Components of a Computer system – Classification of computers - Hardware – Software – Categories of Software – Operating System – Applications of Computers – Network structure – Internet and its services – Intranet – Study of word processor – Preparation of worksheets.		
Unit 2	**Problem Solving Techniques**	**(9)**
Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code. Introduction to C – History of C – Importance of C - C tokens – data types – Operators and expressions – I/O functions.		
Unit 3	**Decision Making Statements**	**(9)**
Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions. Storage classes – Strings – String library functions.		
Unit 4	**Arrays And Structures**	**(9)**
Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types – Union. Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and Structures.		
Unit 5	**Files**	**(9)**
Files – operations on a file – Random access to files – command line arguments. Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives.		

Total Hours: 45

Text Books:
1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Sixth edition, 2012
Reference:

1. Vikas Verma, “A Workbook on C “, Cengage Learning, Second Edition,2012 2. Ashok N Kamthane, “Computer Programming”, Pearson education, Second Impression, 2008.
Web / NPTEL Resources:
1. https://nptel.ac.in/courses/106104128?utm_source 2. https://onlinecourses-archive.nptel.ac.in/noc17_cs43/preview

CO PO Mapping													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	2	1
CO2	3	3	-	1	-	-	-	-	-	-	-	2	1
CO3	3	2	1	-	-	-	-	-	-	-	-	2	1
CO4	3	3	2	1	-	-	-	-	-	-	-	2	1
CO5	3	3	2	2	-	-	-	-	-	-	-	2	2

Assessment Methodology		
Assessment Methodology	**Assessment Tools**	**Marks**
Continuous Internal Assessment	Assignment / Tutorial	10
Internal Test I	Written Examination	05
Internal Test II	Written Examination	05
Model Examination	Written Examination	10
Attendance	Performance	10
Total		40

EEL26201	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	CATEGORY	L	T	P	CREDIT
		ESC	0	0	3	1.5

Course Prerequisite / Preamble

- Understand the basic concepts of electrical quantities and circuits.
- Apply Ohm's law, Kirchhoff's laws and basic circuit principles.
- Understand the fundamentals of AC circuits, magnetic circuits and electrical measurements.
- Gain basic knowledge of electronic devices, digital circuits and operational amplifiers.
- Develop practical skills in electrical measurements, circuit testing, wiring and safety practices.

Course Objective

- Develop practical knowledge of basic electrical circuits and measurements.
- Provide hands-on experience in DC, AC and magnetic circuit experiments.
- Develop skills in testing and analyzing electronic devices and rectifier circuits.
- Familiarize students with digital circuits, flip-flops, counters and op-amp circuits.
- Develop practical skills in circuit construction, testing, measurement

Course Outcome

CO1	Verify basic electrical laws and analyze simple DC and AC circuits.	K2
CO2	Perform electrical measurements and verify magnetic and three-phase circuit principles.	K3
CO3	Test and analyze the characteristics of basic electronic devices and rectifier circuits.	K4
CO4	Construct and verify basic digital circuits such as logic gates, adders, flip-flops and counters.	K3
CO5	Implement and analyze basic operational amplifier circuits and follow electrical safety practices.	K4

LIST OF EXPERIMENTS
1. Verification of Ohm's Law and Kirchhoff's Laws.
2. Verification of Voltage and Current Division Rules in Series and Parallel Circuits.
3. Study of Magnetic Induction and Verification of Faraday's and Lenz's Laws.
4. Measurement of AC Voltage, Current and Power in R-L, R-C and R-L-C Circuits.
5. Measurement of Three-Phase Power using Two-Wattmeter Method.
6. Study and Testing of PN Junction Diode and Zener Diode Characteristics.
7. Construction and Testing of Half-Wave and Full-Wave Rectifiers.
8. Study of BJT Characteristics and its Basic Switching Operation.
9. Verification of Basic Logic Gates and Half Adder/Full Adder.
10. Implementation of Basic Op-Amp Circuits – Inverting, Non-Inverting Amplifier and Comparator.
11. Study of LED and Photodiode Characteristics.
12. Study of Flip-Flop and Counter Circuits.
13. Study of Earthing and Electrical Safety Devices.
14. Study of Domestic Wiring and Basic Lighting Circuits..
Text Books
1. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, McGraw Hill Education, 4th Edition, 2019. 2. V. K. Mehta and Rohit Mehta, Principles of Electronics, S. Chand Publishing, 12th Edition, 2020. 3. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, Pearson Education, 11th Edition, 2015.

Reference
1. S. K. Bhattacharya, Basic Electrical and Electronics Engineering, Pearson Education, 2nd Edition, 2017. 2. Thomas L. Floyd, Electronic Devices, Pearson Education, 10th Edition, 2018. 3. M. S. Sukhija and T. K. Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University Press, 2nd Edition, 2019. 4. A. K. Sawhney, A Course in Electrical and Electronic Measurements and Instrumentation, Dhanpat Rai Publications, 2016.

Web / NPTEL Resources
• NPTEL – Basic Electrical Circuits • NPTEL – Basic Electrical Engineering • Virtual Labs – IIT Kharagpur (Basic Electronics Lab) • Virtual Labs – Electrical Machines and Circuits Lab • MIT OpenCourseWare – Electronics and Circuits

CO-PO Mapping

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

Evaluation Criteria	Assessment Methodology	Marks
Observation and Record	Regular lab Observation and Record writing and timely submission	20
Model Practical Test	Internal Practical Test	15
Continuous Laboratory Performance	Lab Performance, Experiment completion	10
Vivo -Voce	Oral question during lab sessions	5
Attendance	Based on laboratory attendance percentage	10
	Total	60

PCL26202	PHYSICS & CHEMISTRY LABORATORY	CATEGORY	L	T	P	CREDIT
		BSC	0	0	3	1.5

Course Prerequisite / Preamble
• Basic understanding of Physics and Chemistry concepts studied at Higher Secondary level. • This laboratory course provides practical exposure to experimental techniques, measurement methods, and scientific analysis in Physics and Chemistry.
Course Objective
• To develop practical skills in conducting Physics and Chemistry experiments. • To understand the principles behind scientific instruments and measurements. • To enhance analytical and observation skills through laboratory investigations. • To familiarize students with experimental procedures and data interpretation. • To apply theoretical concepts of Physics and Chemistry in practical applications.

Course Outcome

CO1	Perform experiments using standard laboratory instruments and Physics techniques.	**K3**
CO2	Analyse experimental results and verify scientific principles in Physics.	**K4**
CO3	Conduct Chemistry experiments related to volumetric and instrumental analysis.	**K3**
CO4	Apply safety measures and good laboratory practices during experiments	**K3**
CO5	Interpret experimental observations and prepare laboratory reports effectively	**K4**

Physics Laboratory

List of Experiments	**Hours**
1. Radius of curvature of lens – Newton's Ring	(2 Hours)
2. Determination of particle size of lycopodium powder using semiconductor laser.	(2 Hours)
3. Determination of wavelength of laser light using semiconductor laser diffraction.	(2 Hours)
4. Determination of numerical aperture and acceptance angle in an optical fiber.	(2 Hours)
5. Determination of Dispersive power of a prism using Spectrometer.	(2 Hours)
6. Determination of wavelength of mercury spectrum – spectrometer grating .	(2 Hours)
7. Specific rotatory power – Lorentz's half shade polarimeter	(3 Hours)
8. Determination of solar cell characteristics**.**	(3 Hours)

Chemistry Laboratory	
List of Experiments	**Hours**
1. Kinetic study of acid hydrolysis of ethyl acetate	(2 Hours)
2. Total hardness of water - Determination by EDTA method	(2 Hours)
3. Freundlich adsorption isotherm - Adsorption of acetic acid on charcoal	(2 Hours)
4. Chloride content of water - Determination by Mohr's method	(2 Hours)
5. Determination of oxalic acid by permanganometry	(2 Hours)
6. Determination of ferrous by permanganometry	(2 Hours)
7. Determination of carbonate and bicarbonate in a mixture	(3 Hours)
8. Beer-Lamberts law - Determination of ferrous by colorimetry	(3 Hours)
9. Magnesium content in water - Determination by EDTA method	
10. Acetic acid content in vinegar	
11. Dissolved oxygen content in water - Determination by Winkler's method.	
12. Determination of available chlorine in bleaching powder	
13. Conductometric titration	
14. Potentiometric titration	
15. Chemical analysis of salt for cations and anions	

Text Books
1. C.L. Arora, Practical Physics, S. Chand Publications. 2. Vogel's Textbook of Quantitative Chemical Analysis, Pearson Education. 3. B.D. Khosla, Senior Practical Physics, R. Chand Publications.
Reference
1. V.K. Ahluwalia, Practical Chemistry, University Press. 2. S. Chand and Company, Engineering Chemistry Laboratory Manual. 3. P. R. Sasi Kumar, Practical Physics Laboratory Manual.
Web / NPTEL Links
1. https://www.olabs.edu.in/ 2. https://vlab.amrita.edu/

Evaluation Criteria	Assessment Methodology	Marks
Observation and Record	Regular lab Observation and Record writing and timely submission	20
Model Practical Test	Internal Practical Test	15
Continuous Laboratory Performance	Lab Performance, Experiment completion	10
Vivo -Voce	Oral question during lab sessions	5
Attendance	Based on laboratory attendance percentage	10
	Total	60

MEL26203	ENGINEERING GRAPHICS	CATEGORY	L	T	P	CREDIT
		ESC	0	0	3	1.5

Course Prerequisite / Preamble

- Basic knowledge of plane geometry (Class X / XII level).
- Familiarity with drawing instruments and their usage.
- Understanding of spatial visualization and 3D shapes.
- Engineering Graphics is the universal language of engineering communication. This laboratory course equips students with the fundamental skills to interpret, construct, and communicate engineering information through standard graphical representations. Students are trained in manual drafting techniques, orthographic projections, isometric and perspective views, and the conventions of first-angle and third-angle projections in accordance with BIS standards.

Course Objective

- To impart proficiency in the use of drawing instruments and BIS conventions for engineering drawing.
- To develop the ability to construct conic sections, engineering curves, and their applications.
- To train students in orthographic projections of points, lines, planes, and solids.
- To develop skills in drawing isometric and perspective views from multi-view orthographic drawings.
- To enable conversion between 2D multi-view drawings and 3D pictorial representations.

Course Outcome

CO1	Draw engineering curves such as conic sections, involutes, and cycloids using standard drawing instruments following BIS conventions.	K3
CO2	Construct orthographic projections of points and lines in various quadrants and determine true lengths and true inclinations.	K3
CO3	Generate orthographic projections of planes and regular solids in different positions and inclinations.	K3
CO4	Produce isometric projections and isometric views from given orthographic multi-view drawings.	K3
CO5	Develop perspective projections and convert given pictorial views to orthographic drawings demonstrating spatial reasoning.	K3

S.No	Topic	Hours	CO
1	Drawing of engineering curves – Ellipse (Concentric circles method and Oblong method), Parabola and Hyperbola	6	CO1
2	Drawing of engineering curves – Cycloid, Epicycloid, Hypocycloid, and Involute of a circle and a square	6	CO1
3	Projection of points – projection of points in all four quadrants; determination of quadrant from given projections	3	CO2
4	Projection of straight lines – lines parallel and inclined to both reference planes; determination of true length and true inclination by rotating line method	6	CO2
5	Projection of planes – projection of triangular, rectangular, pentagonal, and hexagonal planes in various positions	6	CO3
6	Projection of regular solids (prisms and pyramids) with axis perpendicular and inclined to the reference planes	6	CO3
7	Projection of regular solids (cylinders and cones) with axis inclined to HP and VP; true shape of sections	6	CO3
8	Development of lateral surfaces of prisms, cylinders, pyramids, and cones (including cut solids)	6	CO3
9	Isometric projection and isometric view of simple and combination solids; conversion from orthographic multi-view to isometric view	9	CO4
10	Perspective projection of prisms and pyramids using visual ray method; conversion of pictorial views to orthographic projections (Mini-Exercise)	6	CO5

Text Books

1. Venugopal, K., *Engineering Drawing and Graphics + AutoCAD*, New Age International Publishers, New Delhi, 5th Edition, 2020.

2. Bhatt, N.D., *Engineering Drawing: Plane and Solid Geometry*, Charotar Publishing House, 53rd Edition, 2022.

3. Gopalakrishna, K.R., *Engineering Drawing (Vol. I & II)*, Subhas Stores, Bangalore, 2019.

Reference

1. French, T.E. and Vierck, C.J., *Engineering Drawing and Graphic Technology*, McGraw-Hill, New York, 2005.

2. 2. Shah, M.B. and Rana, B.C., *Engineering Drawing*, Pearson Education, New Delhi, 2nd Edition, 2009.

3. BIS Standards Publication SP: 46 (*Engineering Drawing Practice for Schools and Colleges*), Bureau of Indian Standards, New Delhi.

CO PO Mapping													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	-	1	-	-	1	-	-	-	3	2
CO2	3	2	2	-	1	-	-	1	-	-	-	3	2
CO3	3	3	2	-	1	-	-	1	-	-	-	3	2
CO4	3	3	2	-	2	-	-	1	-	-	-	3	3
CO5	3	3	3	-	2	-	-	1	-	-	-	3	3

Evaluation Criteria	**Assessment Methodology**	**Marks**
Observation and Record	Regular lab Observation and Record writing and timely submission	20
Model Practical Test	Internal Practical Test	15
Continuous Laboratory Performance	Lab Performance, Experiment completion	10
Vivo -Voce	Oral question during lab sessions	5
Attendance	Based on laboratory attendance percentage	10
	Total	60

CDC26201	CAREER DEVELOPMENT SKILL – II (C PROGRAMMING)	CATEGORY	L	T	P	CREDIT
		CDS	0	0	2	1

Course Prerequisite / Preamble

- Basic knowledge of mathematical logic and algorithmic thinking.
- No prior programming experience is required.

Course Objective

The course aims to enable students to:

- Formulate computational logic using visual and structural tools like algorithms, flowcharts, and pseudocode for real-world mathematical problems.
- Master structural control flows by employing conditional statements, looping constructs, and nested logical branching to handle complex decision-making.
- Deconstruct complex problems into modular, reusable components using multi-dimensional arrays, matrix mathematics, and recursive structural functions.
- Manipulate direct memory and custom abstract data objects using pointers, memory addresses, structures, and unions.
- Architect persistent software applications capable of performing file management operations (CRUD) alongside advanced preprocessor configurations.

Course Outcome

CO1	Design systematic algorithms, flowcharts, and basic structural C programs utilizing formatted I/O operations and foundational tokens.	K3
CO2	Implement and evaluate structural control loops and decision-making logic to solve computational mathematics and sequential array manipulation.	K4
CO3	Develop modular, scalable software programs by constructing user-defined functions, recursive algorithms, and complex matrix/string handling routines.	K3
CO4	Utilize pointers and customized data architectures (Structures and Unions) to handle efficient memory mapping and data aggregation.	K3
CO5	Build persistent data systems using sequential and random file access methods alongside preprocessor directives and command-line interfaces.	K5

Syllabus		
Unit 1	**Problem Solving and C Fundamentals**	**(6)**

THEORY: Problem solving techniques – Program development cycle – Algorithm – Flowchart – Pseudocode – Introduction to C – Structure of a C program – C tokens – Keywords and identifiers – Variables and constants – Basic data types – Input and output functions

LAB:

1. Develop algorithms, flowcharts and pseudocode for simple computational problems. Implement programs for simple interest, area calculation and temperature conversion.
2. Write C programs for student mark calculation, total, average, percentage and grade calculation using formatted I/O.

Develop programs using if, if-else, nested-if and switch – largest of three numbers, leap year and menu-driven calculator.

Unit 2	**Trees and Balanced Trees**	**(6)**

THEORY:

Arithmetic, relational and logical operators – Expressions – Type conversion – Formatted I/O – if, if-else, nested-if, switch – for, while, do-while – break and continue – Applications of decision making and looping

LAB:

1. Develop programs using loops – factorial, Fibonacci, prime numbers, palindrome, Armstrong and perfect numbers.
2. Implement one-dimensional array operations – maximum, minimum, second largest, reverse, sum and average.

Implement linear search, binary search and sorting algorithms using arrays.

Unit 3	**Arrays, Functions and Strings**	**(9)**

THEORY:

One-dimensional arrays – Array operations – Searching – Sorting – Two-dimensional arrays – Matrix operations – Functions – Function arguments and return values – Passing arrays to functions – Recursion – Basic storage classes – Strings – String library functions

LAB:

1. Implement matrix operations – addition, subtraction, multiplication, transpose, diagonal sum and symmetric matrix.
2. Develop programs using functions, passing arrays to functions and recursion – factorial, GCD, Fibonacci and Tower of Hanoi.
3. Implement string operations using library functions and user-defined functions – length, copy, compare,
4. Concatenate, reverse and palindrome.Performance comparison of hashing methods.

Unit 4	**Structures, Unions and Pointers**	**(6)**

THEORY:

Structures – Array of structures – Nested structures – Passing structures to functions – typedef – Union – Difference between structure and union – Pointers – Pointer operators – Pointers with arrays, functions, strings and structures

LAB:

1. Develop a Student Information System using structures and arrays of structures.
2. Implement nested structures, typedef and union and demonstrate the difference between structure and union.
3. Develop programs using pointers with arrays and functions – swapping, array processing and call by address.

Unit 5	**File Handling and C**	**(9)**

THEORY:

Files and file modes – Opening and closing files – Reading, writing and appending – Sequential file access – Random file access – fseek(), ftell(), rewind() – Command-line arguments – Preprocessor directives – Macros – Header files – Conditional compilation

LAB:

1. Develop programs using pointers with strings and structures.
2. Develop a File-Based Student Record Management System – create, read, write, append, search and update records.
3. Implement random file access, command-line arguments, macros, user-defined header files and conditional compilation.

Total Hours: 30

Text Books:

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Sixth edition, 2012.

Reference:

2. Vikas Verma, "A Workbook on C ", Cengage Learning, Second Edition,2012

3. Ashok N Kamthane, "Computer Programming", Pearson education, Second Impression, 2008.

Web / NPTEL Resources:
1. https://nptel.ac.in/courses/106104128?utm_source 2. https://onlinecourses-archive.nptel.ac.in/noc17_cs43/preview

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	0	0	1	0	0	0	0	0	0	2
CO2	3	3	2	1	2	0	0	0	0	0	0	2
CO3	3	3	2	2	2	0	0	0	0	0	0	2
CO4	3	3	3	3	2	0	0	0	1	0	0	2
CO5	3	3	3	3	3	0	0	1	2	1	0	3

Assessment Methodology		
Assessment Methodology	Assessment Tools	Marks
Continuous Internal Assessment	Observation / Record Work / Viva Voce	30
Internal Practical Examination	Laboratory Performance	30
End Semester Practical Examination	Experiment and Viva Voce	40
	Total	100

NSC26202	NATIONAL SOCIAL SERVICE / VILLAGE CAMP / RALLY	CATEGORY	L	T	P	CREDIT
		AEC	0	0	1	-

Course Prerequisite / Preamble
• This course provides students with opportunities to participate in community service activities, rural development programs, social awareness campaigns, village camps, and public welfare initiatives. • The course aims to develop social responsibility, leadership qualities, teamwork, communication skills, and awareness about societal issues through active participation in extension and outreach activities.
Course Objective
• To promote social responsibility and community service among students. • To create awareness about rural development, environmental protection, and social welfare activities. • To develop leadership qualities, teamwork, and communication skills. • To encourage active participation in village camps, rallies, and social awareness programs. • To inculcate ethical values, discipline, and national integration.

CO	COURSE OUTCOME	K LEVEL
CO1	Understand the importance of community service and social responsibility.	(K2)
CO2	Participate actively in village camps, rallies, and social awareness programs.	(K3)
CO3	Develop leadership, teamwork, and interpersonal communication skills.	(K3)
CO4	Apply ethical values and social commitment in community development activities.	(K3)
CO5	Demonstrate discipline, environmental awareness, and national integration through extension activities.	(K4)

Syllabus
LIST OF ACTIVITIES
1. Orientation programme on National Social Service, social responsibility, and community engagement.
2. Campus cleanliness and environmental awareness activities.
3. Tree plantation and green campus initiatives.
4. Participation in village survey and rural development activities.
5. Health awareness rally and community interaction programme.
6. Awareness programmes on hygiene, sanitation, and public health.

7. Blood donation awareness / road safety / anti-drug awareness rally.
8. Village camp activities including teamwork, leadership, and social service.
9. Participation in national festivals, social campaigns, and public welfare programmes.
10. Preparation of activity report, reflection, and presentation of community service activities.

Reference

1. National Service Scheme Manual, Government of India.
2. Youth Red Cross and Community Service Handbooks.
3. Environmental and Rural Development Awareness Materials.
4. Swachh Bharat Mission and Social Welfare Programme Guidelines.

Web / NPTEL Resources

1. https://nss.gov.in/
2. https://www.india.gov.in/
3. https://www.mygov.in/
4. https://www.un.org/sustainabledevelopment/

CO-PO Mapping

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

Assessment Methodology

Assessment Methodology	Assessment Tools	Marks
Participation and Involvement	Community Service Activities / Village Camp / Rally	40
Activity Record and Report	Field Diary / Documentation / Reflection Report	30
Presentation and Teamwork Group	Participation and Communication Skills	20
Discipline and Attendance	Regularity and Conduct	10
Total		100