MANAKULA VINAYAGAR INSTITUTE OF TECHNOLOGY

An Autonomous Institution

Affiliated to Pondicherry University, Approved by AICTE, New Delhi
Accredited by NBA, New Delhi and NAAC With 'A' Grade
Kalitheerthalkuppam, Puducherry - 605 107

(An Autonomous Institution)

Curriculum & Syllabus
for
UG Degree Course

in

B.Tech
Information Technology

REGULATIONS 2025
(R - 2025)

(With effect from academic year 2025-2026)

MANAKULA VINAYAGAR INSTITUTE OF TECHNOLOGY
DEPARTMENT OF INFORMATION TECHNOLOGY
PUDUCHERRY

Dr. P. SIVAKUMAR, M.E., Ph.D.,
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Dept. of Information Technology
Manakula Vinayagar Institute of Technology
Kalitheerthalkuppam, Puducherry - 605 107.

A. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

B. Range of Credits: In the light of the fact that a typical Model AICTE Four-year Under Graduate degree program in Engineering & Technology has about 163 credits, the total number of credits proposed for the four-year B. Tech in Information Technology is kept as 165.

C. Structure of UG Program in Information Technology (IT): The structure of UG program in Information Technology (IT) shall have essentially the following categories of courses with the breakup of credits as given:

S.No.	Category	AICTE	PU R-2023	MIT Proposed IT -R-2025
1	Humanities and Social Sciences including Management courses (HS)	**16**	**16**	**12**
2	Basic Science courses (BS)	**23**	**25**	**20**
3	Engineering Science courses including workshop, drawing, basics of electronics/electrical/mechanical/computer etc. (ES)	**29**	**24**	**29**
4	Professional core courses (PC)	**59**	**66**	**68**
5	Professional Elective courses relevant to chosen specialization/branch (PE)	**12**	**12**	**12**
6	Open subjects – Electives from other technical and /or emerging subjects (OE)	**09**	**09**	**09**
7	Core Enrichment Course (Project work, seminar, mini project and internship / in-plant training in industry or elsewhere) (CEC)	**15**	**17**	**15**
8	Employability Enhancement Courses (EEC)	**-**	**-**	non-credit
9	Mandatory Courses (MCC) [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	non-credit	non-credit	non-credit
	Total	**163**	**169**	**165**

SUMMARY OF ALL COURSES

S.No	Course Category	I	II	III	IV	V	VI	VII	VIII	Total Credits
1	HS	2	3				3	3	1	12
2	BS	4	4+4 =8	4	4					20
3	ES	4+3+1+1+4 =13	4+1+4 =9	3+4 =7						29
4	PC		3	4+4+4 =12	4+4+3+4+3 =18	4+4+3+4 =15	4+4+4+4 =16	4		68
5	PE					3	3	3	3	12
6	OE						3	3	3	09
7	CEC				1		1	1+4 =5	2+6 =8	15
8	EEC	-	-	-	-	-	-			-
9	MCC	*	*	*	*	*	*			-
Total		19	23	23	23	22	22	18	15	165

HS - Humanities and Social Sciences including Management Course;
BS – Basic Science Course;
ES – Engineering Science Course;
PC – Professional Core Course;
CEC – Core Enrichment Course (Project work, seminar, mini project and internship / in-plant training in industry or elsewhere);
PE – Professional Elective Course;
OE- Open Elective Courses;
EEC –Employability Enhancement Courses;
MCC – Mandatory Course;

First year -IT

MVIT- B.Tech. IT- Curriculum- R 2025 SEMESTER I										
S.No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credit**	**MARKS**		
								CAM	**ESM**	**TM**
		Induction Program								
THEORY COURSES										
1.	25UMAT11	Matrices and Calculus	BS	3	1	0	4	40	60	100
2.	25UECT12	Basic Electronics Engineering	ES	3	0	0	3	40	60	100
3.	25UHST13	Universal Human Values II	HS	2	0	0	2	40	60	100
4.	25UCST14	Computational Thinking	ES	3	0	0	3	40	60	100
INTEGRATED COURSE										
5.	25UCSI15	Problem solving using Python	ES	3	0	2	4	50	50	100
PRACTICAL COURSES										
6.	25UECP16	Basic Electronics Engineering Lab	ES	0	0	2	1	60	40	100
7.	25UGEP17	Fabrication Lab	ES	0	0	2	1	60	40	100
8.	25UGEP18	Design Thinking and Idea Lab	ES	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
9.	25UPCE11	Career Development Skills	EEC	0	0	2	0	-	-	-
MANDATORY COURSES										
10.	25UMCC11	IKS – Concepts and applications in Engineering and Science	MCC	1	0	1	0	-	-	-
11	25UMCC12	Holistic Wellness	MCC	0	0	2	0	-	-	-
						Total	**19**	**390**	**410**	**800**

MVIT- B.Tech. IT- Curriculum- R 2025 SEMESTER II										
S.No	**Course**	**Course Title**	**Category**	**L**	**T**	**P**	**Credit**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UMAT21	Differential Equations and Transforms	BS	3	1	0	4	40	60	100
2.	25UCST22	Computer Organization and Architecture	PC	3	0	0	3	40	60	100
3.	25UPHT23	Applied Physics for Computing Engineers	BS	3	0	0	3	40	60	100
4.	25UECT24	Digital System Design	ES	2	1	0	3	40	60	100
INTEGRATED COURSES										
5.	25UCSI26	Programming in C	ES	3	0	2	4	50	50	100
6	25UHSI26	Professional Communication for Engineers	HS	1	0	4	3	50	50	100
PRACTICAL COURSES										
7	25UPHP27	Applied Physics Lab	BS	0	0	2	1	60	40	100
8	25UECP28	Digital System Design Lab	ES	0	0	2	1	60	40	100
9	25UGEP29	Engineering Graphics and Auto CAD Lab	ES	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
10	25UPCE21	Communication Skills	EEC	0	0	2	0	-	-	-
11	25UCCC21	Certification Course-I	CCC	0	0	0	0	-	-	-
MANDATORY COURSES										
12	25UMCC21	IKS in Humanities and Social Science	MCC	1	0	1	0	-	-	-
13	25UMCC22	Environmental Science& Sustainability	MCC	0	0	2	0	-	-	-
					Total		**23**	**440**	**460**	**900**

Second year -IT

B.TECH. Information Technology (Autonomous R 2025)
CURRICULUM FROM THE ACADEMIC YEAR 2025-26

SEMESTER III										
Sl. No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credit**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UMAT32	Probability and Statistics	BS	3	1	0	4	40	60	100
2.	25UITT31	Data Structures and Algorithms	PC	3	0	0	3	40	60	100
3.	25UITT32	Object Oriented Programming using Java	PC	3	0	0	3	40	60	100
4.	25UITT33	Microprocessors and Microcontrollers	ES	3	0	0	3	40	60	100
5.	25UITT34	Communication Engineering	ES	3	0	0	3	40	60	100
INTEGRATED COURSE										
6.	25UITI31	Fundamentals of Data Science	PC	3	0	2	4	50	50	100
PRACTICAL COURSES										
7.	25UITP31	Data Structures and Algorithms Lab	PC	0	0	2	1	60	40	100
8.	25UITP32	Object Oriented Programming using Java Lab	PC	0	0	2	1	60	40	100
9.	25UITP33	Microprocessors and Microcontrollers Lab	ES	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
10.	25UPCE31	Personality Development Skills	EEC	0	0	2	0	-	-	-
11.	25UCCCXX	Certification Course-II	CCC	0	0	0	0	-	-	-
MANDATORY COURSE										
12.	25UMCC31	Indian Constitution and Human Rights	MCC	2	0	0	0	-	-	-
						Total	**23**	**430**	**470**	**900**

B.TECH. Information Technology (Autonomous R 2025)

SEMESTER IV										
Sl. No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credit**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UMAT43	Discrete Mathematics	BS	3	1	0	4	40	60	100
2.	25UITT41	Operating Systems	PC	3	0	0	3	40	60	100
3.	25UITT42	Database Management Systems	PC	3	0	0	3	40	60	100
4.	25UITT43	Software Engineering	PC	3	0	0	3	40	60	100
5.	25UITT44	Information Coding Techniques	PC	3	0	0	3	40	60	100
INTEGRATED COURSE										
6.	25UITI41	Design and Analysis of Algorithms	PC	3	0	2	4	50	50	100
PRACTICAL COURSES										
7.	25UITP41	Operating Systems Lab	PC	0	0	2	1	60	40	100
8.	25UITP42	Database Management Systems Lab	PC	0	0	2	1	60	40	100
CORE ENRICHMENT COURSE										
9.	25UITW41	Mini Project – I	CEC	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
10.	25UPCE41	Professionalism and Basic Aptitude	EEC	0	0	2	0	-	-	-
11.	25UCCCXX	Certification Course-III	CCC	0	0	0	0	-	-	-
MANDATORY COURSE										
12.	25UMCC41	Entrepreneurial skills and concepts	MCC	2	0	0	0	-	-	-
						Total	**23**	**430**	**470**	**900**

B.TECH. Information Technology (Autonomous R 2025)

Third year -IT

SEMESTER V										
S.No	**Course**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UITT51	Computer Networks	PC	3	0	0	3	40	60	100
2.	25UITT52	Web Technology	PC	3	0	0	3	40	60	100
3.	25UITT53	Theory of Computation	PC	3	0	0	3	40	60	100
4.	25UITT54	Cloud Computing	PC	3	0	0	3	40	60	100
5.	25UITLXX	Professional Elective-I	PE	3	0	0	3	40	60	100
INTEGRATED COURSE										
6.	25UITI51	UI and UX Design	PC	3	0	2	4	50	50	100
PRACTICAL COURSES										
7	25UITP51	Computer Networks Lab	PC	0	0	2	1	60	40	100
8	25UITP52	Web Technology Lab	PC	0	0	2	1	60	40	100
9	25UITP53	Cloud Computing Lab	PC	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
10	25UPCE51	Quantitative and Verbal Aptitude	EEC	0	0	2	0	-	-	-
11	25UCCCXX	Certification Course-IV	CCC	0	0	0	0	-	-	-
						Total	**22**	**430**	**470**	**900**

B.TECH. Information Technology (Autonomous R 2025)

SEMESTER VI										
S.No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UITT61	Artificial Intelligence	PC	3	0	0	3	40	60	100
2.	25UITT62	Embedded Systems and IoT	PC	3	0	0	3	40	60	100
3.	25UHSTXX	Principles of Management	HS	3	0	0	3	40	60	100
4.	25UITLXX	Professional Elective-II	PE	3	0	0	3	40	60	100
5.	25UITOXX	Open Elective-I	OE	3	0	0	3	40	60	100
INTEGRATED COURSE										
6.	25UITI61	Full Stack Web Development	PC	3	0	2	4	50	50	100
PRACTICAL COURSES										
7.	25UITP61	Artificial Intelligence Lab	PC	0	0	2	1	60	40	100
8.	25UITP62	Embedded Systems and IoT Lab	PC	0	0	2	1	60	40	100
CORE ENRICHMENT COURSE										
9.	25UITW61	Mini Project -II	CEC	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
10.	25UPCE61	Analytical and Reasoning Skills	EEC	0	0	2	0	-	-	-
11.	25UCCCXX	Certification Course-V	CCC	0	0	0	0	-	-	-
						Total	**22**	**430**	**470**	**900**

B.TECH. Information Technology (Autonomous R 2025)

Final year -IT

SEMESTER VII										
S.No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UITT71	Mobile Application Development	PC	3	0	0	3	40	60	100
2.	25UHSTXX	Organizational Behavior	HS	3	0	0	3	40	60	100
3.	25UITLXX	Professional Elective-III	PE	3	0	0	3	40	60	100
4.	25UITOXX	Open Elective-II	OE	3	0	0	3	40	60	100
PRACTICAL COURSE										
5	25UITP71	Mobile Application Development Lab	PC	0	0	2	1	60	40	100
CORE ENRICHMENT COURSE										
6	25UITW71	Seminar	CEC	0	0	2	1	100	-	100
7	25UITW72	Project Work - Phase -I	CEC	0	0	8	4	60	40	100
						Total	**18**	**380**	**320**	**700**

B.TECH. Information Technology (Autonomous R 2025)

SEMESTER VIII										
S.No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credits**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UITLXX	Professional Elective-IV	PE	3	0	0	3	40	60	100
2.	25UITOXX	Open Elective-III	OE	3	0	0	3	40	60	100
3	25UHST81	Professional Ethics	HS	1	0	0	1	100	-	100
CORE ENRICHMENT COURSES										
4	25UITW81	Internship/In-plant Training	CEC	0	0	0	2	100	-	100
5	25UITW82	Project Work - Phase -II	CEC	0	0	12	6	60	40	100
Total							**15**	**340**	**160**	**500**

LIST OF PROFESSIONAL ELECTIVE COURSES (PE)

S.No	Course Code	Course Title (PE)	Periods				MARKS		
			L	T	P	Credits	CAM	ESM	TM
		Semester V – Professional Electives							
1.	25UITL01	Software Project Management	3	0	0	3	40	60	100
2.	25UITL02	Distributed Computing	3	0	0	3	40	60	100
3.	25UITL03	Object-Oriented Analysis and Design	3	0	0	3	40	60	100
4.	25UITL04	Software Testing and Automation	3	0	0	3	40	60	100
5.	25UITL05	Linux Programming	3	0	0	3	40	60	100
		Semester VI – Professional Electives							
6.	25UITL06	Data Mining and Warehousing	3	0	0	3	40	60	100
7.	25UITL07	DevOps	3	0	0	3	40	60	100
8.	25UITL08	Cloud Service Management	3	0	0	3	40	60	100
9.	25UITL09	Wireless Networks	3	0	0	3	40	60	100
10.	25UITL10	Big Data Analytics	3	0	0	3	40	60	100
		Semester VII – Professional Electives							
11.	25UITL11	Machine Learning	3	0	0	3	40	60	100
12.	25UITL12	Block chain Technologies	3	0	0	3	40	60	100
13.	25UITL13	Cryptography and Cyber Security	3	0	0	3	40	60	100
14.	25UITL14	Generative AI	3	0	0	3	40	60	100
15.	25UITL15	Digital and Mobile Forensic	3	0	0	3	40	60	100
		Semester VIII – Professional Electives							
16	25UITL16	Software Defined Networks	3	0	0	3	40	60	100
17	25UITL17	Digital Marketing	3	0	0	3	40	60	100
18	25UITL18	Quantum Computing	3	0	0	3	40	60	100
19	25UITL19	Advanced Mobile Communications(5G)	3	0	0	3	40	60	100
20	25UITL20	Ethical Hacking	3	0	0	3	40	60	100

HONORS DEGREE

B.Tech. IT. (Honors) in Information Technology

(Data Science)

HONOR COURSES									
SEM	**Course Code**	**Course Title**	**Periods**				**MARKS**		
			L	**T**	**P**	**Credits**	**CAM**	**ESM**	**TM**
Theory									
III	25UITH01	Exploratory Data Analysis	3	1	0	4	40	60	100
IV	25UITH02	Business Analytics	3	1	0	4	40	60	100
V	25UITH03	Computer Vision	3	1	0	4	40	60	100
VI	25UITH04	Natural Language Processing	3	1	0	4	40	60	100
VII	25UITH05	Neural Networks and Deep Learning	3	1	0	4	40	60	100
						20			

B.Tech. IT -Minor Courses offered to other Departments
(MECH,ECE,EEE,RA,FT)

Minor in Full Stack Web Development

MINOR COURSES									
SEM	**Course Code**	**Course Title**	**Periods**				**MARKS**		
			L	**T**	**P**	**Credits**	**CAM**	**ESM**	**TM**
Theory									
III	25UITM01	Web Programming I	3	1	0	4	40	60	100
IV	25UITM02	Web Programming II	3	1	0	4	40	60	100
V	25UITM03	Fundamentals of Cloud Computing	3	1	0	4	40	60	100
VI	25UITM04	Fundamentals of UI and UX Design	3	1	0	4	40	60	100
VII	25UITM05	Fundamentals of Full Stack Web Development	3	1	0	4	40	60	100
						20			

IT DEPARTMENT - OPEN ELECTIVE COURSES (OE) offered to Other Departments

OPEN ELECTIVE COURSES Permitted Departments - ECE, EEE, MECH,RA,FT										
S.No	Course Code	Course Title	Periods				MARKS		
			L	T	P	Credits	CAM	ESM	TM
Theory									
1	25UITO01	Computer Hardware and Troubleshooting	3	0	0	3	40	60	100
2	25UITO02	Database Engineering	3	0	0	3	40	60	100
3	25UITO03	Computer Network and Management	3	0	0	3	40	60	100
4	25UITO04	Web Essentials	3	0	0	3	40	60	100
5	25UITO05	Open-Source Software	3	0	0	3	40	60	100
6	25UITO06	Essentials of Mobile Application Development	3	0	0	3	40	60	100

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH POs and PSOs:

A broad relation between the POs & PSOs objectives and the outcomes is given in the following table:

PEO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PSO1	PSO2
PEO1	3	3	3	2	3	1	1	3	3	3	3	3	3
PEO2	3	3	2	3	2	1	1	2	2	1	3	2	3
PEO3	3	2	3	1	3	2	2	3	3	3	3	2	3
PEO4	1	1	1	1	1	3	3	3	3	2	3	1	2

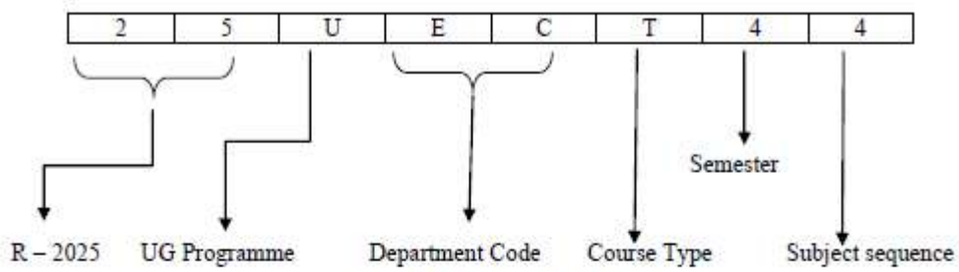

Fig. 1 Course code formation

DEPARTMENT CODE	COURSE TYPE	SEMESTER
AI- Artificial Intelligence and Machine Learning CS – Computer Science and Engineering EC – Electronics and Communication Engineering EE – Electrical and Electronics Engineering FT – Food Technology IT – Information Technology IC – IOT, Cyber security and Block chain Technology ME – Mechanical Engineering RA – Robotics and Automation HS –Professional Communication for Engineers & Management MA – Mathematics PH – Physics CH – Chemistry PC – Professional Competency GE – General Engineering	T – Theory P - Practical I - Integrated course L – Professional Elective O – Open Elective W - Project Work, mini project, internship, implant training, seminar E-Employability Enhancement courses H – Honors M – Minor MCC – Mandatory Course CCC – Certification course CCN – NPTEL Course	1 2 3 4 5 6 7 8

FIRST YEAR - MVIT- B.Tech. IT- Curriculum- R 2025

SEMESTER I							
S.No	**Course Code**	**Course Title**	**category**	**L**	**T**	**P**	**Credits**
		Induction Program					
THEORY COURSES							
1.	25UMAT11	Matrices and Calculus	BS	3	1	0	4
2.	25UECT12	Basic Electronics Engineering	ES	3	0	0	3
3.	25UHST13	Universal Human Values II	HS	2	0	0	2
4.	25UCST14	Computational Thinking	ES	3	0	0	3
INTEGRATED COURSE							
5.	25UCSI15	Problem solving using Python	ES	3	0	2	4
PRACTICAL COURSES							
6.	25UECP16	Basic Electronics Engineering Lab	ES	0	0	2	1
7.	25UGEP17	Fabrication Lab	ES	0	0	2	1
8.	25UGEP18	Design Thinking and Idea Lab	ES	0	0	2	1
EMPLOYABILITY ENHANCEMENT COURSES							
9.	25UPCE11	Career Development Skills	EEC	0	0	2	0
MANDATORY COURSES							
10.	25UMCC11	IKS – Concepts and applications in Engineering and Science	MCC	1	0	1	0
11	25UMCC12	Holistic Wellness	MCC	0	0	2	0
Total							**19**

SEMESTER II							
S.No	**Course Code**	**Course Title**	**category**	**L**	**T**	**P**	**Credits**
THEORY COURSES							
1.	25UMAT21	Differential Equations and Transforms	BS	3	1	0	4
2.	25UCST22	Computer Organization and Architecture	PC	3	0	0	3
3.	25UPHT23	Applied Physics for Computing Engineers	BS	3	0	0	3
4.	25UECT24	Digital System Design	ES	2	1	0	3
INTEGRATED COURSES							
5.	25UCSI26	Programming in C	ES	3	0	2	4
6	25UHSI26	Professional Communication for Engineers	HS	1	0	4	3
PRACTICAL COURSES							
7	25UPHP27	Applied Physics Lab	BS	0	0	2	1
8	25UECP28	Digital System Design Lab	ES	0	0	2	1
9	25UGEP29	Engineering Graphics and Auto CAD Lab	ES	0	0	2	1
EMPLOYABILITY ENHANCEMENT COURSES							
10	25UPCE21	Communication Skills	EEC	0	0	2	0
11	25UCCC21	Certification Course 1	CCC	0	0	0	0
MANDATORY COURSES							
12	25UMCC21	IKS in Humanities and Social Science	MCC	1	0	1	0
13	25UMCC22	Environmental Science& Sustainability	MCC	0	0	2	0
Total							**23**

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

Course Prerequisite

Higher Secondary Level Mathematics

Course Objective

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

SYLLABUS

UNIT I MATRICES (12 Hours)

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

UNIT II FUNCTIONS OF SEVERAL VARIABLES (12 Hours)

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

UNIT III INTEGRAL CALCULUS (12 Hours)

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

UNIT IV VECTOR DIFFERENTIATION (12 Hours)

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

UNIT V VECTOR INTEGRATION (12 Hours)

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

TOTAL PERIODS: 60

TEXT BOOKS

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

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

REFERENCE BOOKS

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

Online Courses/NPTEL/SWAYAM:
https://nptel.ac.in/courses/111106100
https://nptel.ac.in/courses/111104125
https://nptel.ac.in/courses/111105121
https://nptel.ac.in/courses/111107112

Course Outcome On the successful completion of the course, students will be able to		
CO1	Find eigenvalues and eigenvectors, verify the Cayley-Hamilton theorem, and perform orthogonal diagonalization.	Apply (K3)
CO2	Compute partial derivatives, determine total derivatives, Jacobians, employ Taylor's series, and find extremes of functions of two variables.	Apply (K3)
CO3	Demonstrate proficiency in evaluating double integration and triple integration and using them to compute area and volume.	Apply (K3)
CO4	Compute gradients, divergence, curl, directional derivatives, and apply vector identities to solve vector field problems.	Apply (K3)
CO5	Apply Green's theorem, Stoke's theorem and Gauss divergence theorem.	Apply (K3)

CO-PO -Mapping - MATRICES AND CALCULUS

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

25UMAT11 - MATRICES AND CALCULUS

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

25UECT12	BASIC ELECTRONICS ENGINEERING	Category	L	T	P	Credit
		ES	3	0	0	3

Course Prerequisite:

- Basic knowledge about electronic circuits

Course Objective

- To learn the fundamental skills in the construction of electronics circuit design and develop various electronic systems.

SYLLABUS

UNIT I SEMI CONDUCTORS AND DIODES (9 Hours)

Conductors - Semiconductors - Intrinsic Semiconductors - Extrinsic Semiconductors. Diode Theory, Basic Ideas - ideal Diode - Forward and Reverse Bias - Diode Equation - Volt-Ampere Characteristic- Special diodes, symbol of zener diode - operation - V-I characteristics - symbol of photo diode - working principle - LED symbol and principle.

UNIT II RECTIFIERS (9 Hours)

Half-wave Rectifier - Full-wave and Bridge Rectifier - derivation of Ripple factor - efficiency of Half-wave -Full-wave and Bridge rectifiers, Merits and demerits of Half-wave - Full-wave and Bridge rectifiers - Comparisons of rectifiers.

UNIT III BIPOLAR JUNCTION &, FIELD-EFFECT TRANSISTORS (9 Hours)

Symbols of PNP and NPN transistors and their working principles -Transistor - Construction & working - Input and output characteristics of CB and CE configuration- Transistor as an Amplifier - Construction and working of JFET & MOSFET.

UNIT IV OSCILLATORS (9 Hours)

Principle of oscillation and Barkhausen criteria - LC oscillators: Hartley and Colpitts (operation and applications) - RC oscillators: Phase shift and Wien bridge (principle and working) - Crystal oscillator basics and applications-555 timer- Astable and Monostable Multivibrator

UNIT V OPERATIONAL AMPLIFIERS (9 Hours)

Characteristics of Op-Amps, Introduction to Op-amp - Op-amp Block Diagram - ideal and practical Op-Amps specifications - 741 Op-Amps & its features - Op-amp parameters & Measurement - Applications of Op-Amps: Inverting and Non-inverting amplifier - Integrator and differentiator - Comparators.

TOTAL PERIODS: 45

TEXTBOOKS:

1. Albert Malvino and David J Bates, “Electronic Principles”, Tata McGraw–Hill, 9thEdition, 2021. (Unit 1 & 2)
2. Boyelstad, “Electronic Devices and Circuits Theory”, Pearson Education, 11thEdition, 2013.(Unit 1, 2 & 3)
3. Morris Mano, “Digital design”, PHI Learning, 4thEdition, 2016. (Unit 4)
4. Ramakanth A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, PHI, 4thEdition, 2015. (Unit 5)
5. D. Roy Chowdhury, “Linear Integrated Circuits”, New Age International Pvt.Ltd., 5th Edition, 2018.(Unit 5)

REFERENCES:

1. Robert L.Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson/PHI, 10*th* Edition, 2010.
2. David A.Bell, "Electronic Devices and Circuits", Oxford, 5*th* Edition, 2009.
3. S.Salivahanan, Kumar, Vallavaraj, "Electronic Devices and Circuits", TATA McGraw Hill, 2*nd* Edition, 2003.
4. David A, "Operational Amplifiers & Linear ICs", Oxford Uni. Press, 3*rd* Edition, 2005. (Unit 5)

ONLINE / NPTEL Courses:

1. Introduction to Basic Electronics: https://archive.nptel.ac.in/courses/122/106/122106025/
2. Basic Electronics: https://archive.nptel.ac.in/courses/108/101/108101091/

Course Outcome

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

CO1	Understand the semiconductor physics of the intrinsic, p, and n materials.	Understand (K2)
CO2	Understand the function and operation of diodes, transistors and amplifiers.	Understand (K2)
CO3	Analyze the performance of BJT & FETs and its uses in amplifiers and oscillators.	Analyze (K3)
CO4	Analyze and design operational amplifier circuits.	Analyze (K3)
CO5	Understand the architecture, functions & their applications of IC 741 OP-Amp.	Understand (K2)

CO-PO/PSO MAPPING -BASIC ELECTRONICS ENGINEERING

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

25UECT12 - BASIC ELECTRONICS ENGINEERING

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

25UHST13	UNIVERSAL HUMAN VALUES - II	Category	L	T	P	Credit
		HS	2	0	0	2

Course Objective:

• To highlight the plausible implications of such a holistic understanding in terms of ethical human conduct, trustful, mutually fulfilling human behaviour, and mutually enriching interaction with Nature.

Syllabus

UNIT I INTRODUCTION TO VALUE EDUCATION (6 Hours)

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity the Basic Human Aspirations, Happiness and Prosperity Current Scenario, Method to Fulfil the Basic Human Aspirations.

UNIT II HARMONY IN THE HUMAN BEING (6 Hours)

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

UNIT III HARMONY IN THE FAMILY AND SOCIETY (6 Hours)

Harmony in the Family, the Basic Unit of Human Interaction, Trust, Foundational Value in Relationship, Respect, Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT IV HARMONY IN THE NATURE/EXISTENCE (6 Hours)

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence. Describing, Defining, Classifying, providing examples or evidence, writing introduction and conclusion.

UNIT V IMPLICATIONS OF THE HOLISTIC UNDERSTANDING (6 Hours)

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

TOTAL PERIODS: 30

TEXT BOOKS:

1. Premvir Kapoor, “Professional Ethics and Human Values”, Khanna Book Publishing Company, New Delhi, 2022.
2. R RGaur,R Asthana, G P Bagaria, “The Textbook - A Foundation Course in Human Values and Professional Ethics”, Excel Books, New Delhi, 2nd Revised Edition, 2019.
3. RR Gaur, R Asthana, G P Bagaria, “The Teacher’s Manual- Teachers Manual for A Foundation Course in Human Values and Professional Ethics”, 2nd Revised Edition, 2019.

REFERENCES:

1. Annie Leonard, “The Story of Stuff”, 2011.
2. A.N. Tripathi,“Human Values”, New Age Intl. Publishers, New Delhi, 2004.
3. Mohandas Karamchand Gandhi, “The Story of My Experiments with Truth”, FP classic, 2009.
4. A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, “VanVidya: EkParichaya”, 1999.

Course Outcome

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

CO1	Understand holistic vision of life.	Understand (K2)
CO2	Enhance socially responsible behaviour.	Understand (K2)
CO3	Understand the responsibility of environmental work.	Understand (K2)
CO4	Understand the Competence and Capabilities for Maintaining Health and Hygiene.	Understand (K2)
CO5	Appreciate the aspiration for excellence (merit) and gratitude for all.	Understand (K2)

CO-PO/PSO MAPPING - UNIVERSAL HUMAN VALUES II

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

25UHST13 - UNIVERSAL HUMAN VALUES II

Assessment Methodology	**Assessment Tools**	**Marks**
Test		25
Case study analysis	Group discussion and report	5
Value-based project proposal	Presentation and peer evaluation	5
Attendance		5
Total		**40**

25UCST14	COMPUTATIONAL THINKING	Category	L	T	P	Credit
		ES	3	0	0	3

Course Prerequisite

Higher Secondary Level Mathematics and General computer usage.

Course Objective

To develop computational thinking skills through understanding data, pattern recognition, algorithms, decomposition, abstraction, modeling, and complexity analysis in problem-solving and automation.

Syllabus

UNIT I INTRODUCTION TO COMPUTATIONAL THINKING (9 Hours)

Understanding the concepts: Decomposition, pattern recognition / data representation, generalization / abstraction and Algorithms. Complexity, Modeling, Automation, Analysis, visualization.

UNIT II UNDERSTANDING DATA AND PATTERN RECOGNITION (9 Hours)

Performing analytics on numeric data using any spreadsheet software and visualizing the data using charts, histograms, scatter plots, graphs, Logical thinking – reasoning, Pattern recognition in data, data sequences, puzzles, nonograms. Data Encryption – ciphering sentences and Compression

UNIT III DECOMPOSITION AND ALGORITHMIC THINKING (9 Hours)

Decomposition, Algorithmic thinking – creating oral algorithms for everyday tasks – visualizing algorithms through sequence of steps, pseudocode, flow charts, selection, iteration, functions and procedures

UNIT IV ABSTRACTION AND MODELING: (9 Hours)

Abstraction and Modeling, Automata and Finite State Machine, Object Description, Objects and Objects based modeling – Repair, Reuse, Recycle.

UNIT V UNDERSTANDING COMPLEXITY: (9 Hours)

Understanding complexity, sorting algorithms, search algorithms, Debugging, enhancing the clarity of a program – documentation, style, idioms, Automation and Simulation, AI, and Computational thinking.

TOTAL PERIODS: 45

TEXT BOOKS:

1. Karl Beecher, Computational Thinking – A Beginner's Guide to Problem–Solving and Programming, BCS Learning, 2017.
2. Venkatesh G, Madhavan Mukund, Computational Thinking, Notion Press, 1st Edition, 2021.
3. A.DavidD.Riley,KennyA.Hunt, Computational Thinking for the Modern Problem Solver, CRC Press, 2015

REFERENCE BOOKS

1. David Clark, Computational and Algorithmic Thinking Book 2, AMT Publishing, 2016.
2. Paul Curzon, "Computing Without Computers: A Gentle Introduction to Computer Programming, Data Structures, and Algorithms", 2014.
3. Wang Paul S, From computing to computational thinking, CRC Press, 2016.
4. Peter J. Denning, Matti Tedre, Computational Thinking, MIT Press, 2019.
5. Paolo Ferragina, Fabrizio Luccio, Computational Thinking_ First Algorithms, Then Code, Springer International Publishing, 2018.
6. Aman Yadav, Ulf Berthelsen, Computational Thinking in Education_ A Pedagogical Perspective, Routledge, 2021.
7. Zhiwei Xu, Jialin Zhang, Computational Thinking_ A Perspective on Computer Science, Springer, 2021.

Course Outcomes

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

CO1	Explain the key concepts of decomposition, pattern recognition, abstraction, algorithms, complexity, modeling, automation, and visualization.	Understand (K2)
CO2	Recall the fundamental concepts of data analytics, visualization techniques, pattern recognition, and basic data encryption methods.	Remember (K1)
CO3	Apply decomposition and algorithmic thinking to design and represent algorithms for everyday tasks using pseudocode, flowcharts, and control structures such as selection, iteration, functions, and procedures.	Apply (K3)
CO4	Apply the concepts of abstraction and modeling to represent systems using automata, finite state machines, and object-based models focusing on repair, reuse, and recycle principles.	Apply (K3)
CO5	Analyze the efficiency of sorting and search algorithms and debug program errors.	Analyze (K4)

CO-PO/PSO MAPPING - COMPUTATIONAL THINKING

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

25UCST14 - COMPUTATIONAL THINKING

Assessment Methodology	Assessment Tools	Marks
Test		25
Problem based Assignment	Moodle/Google form	5
Project based	Demo and viva	5
Attendance		5
Total		**40**

25UCSI15	PROBLEM SOLVING USING PYTHON	Category	L	T	P	Credit
		ES	3	0	2	4

Course Prerequisite:

- Basic programming skills

Course Objective:

- To impart the knowledge of Python basic structure, components, object storage, exception handling, and graphics toolkit using Tinker

SYLLABUS

UNIT I INTRODUCTION (9 Hours)

History - Features -basic syntax - Data types - variables - Manipulating Numbers - Text Manipulations - Control Statements- Python Built-in Functions.

UNIT II COMPONENTS OF PYTHON PROGRAMMING (9 Hours)

Operator Basics - Numbers - String - List - Tuples - Dictionaries - Files - Object Storage - Type Conversion - Type Comparison - Statements – Assignments.

UNIT III FUNCTIONS AND PACKAGE (9 Hours)

Classes and Objects - creating a class, class methods, class inheritance. Functions Definition and Execution - Arguments - Return Values - Advanced Function Calling - Modules - Importing modules – Packages and Interfaces - Creating a module.

UNIT IV EXCEPTION HANDLING AND FILES (9 Hours)

Exception Handling- Building in Exceptions- Files, File operations, reading a file content, writing a file, modifying files pos, controlling file I/O, Manipulating file paths.

UNIT V GUI PROGRAMMING AND GRAPHICS (9 Hours)

GUI Programming toolkits – Introduction to Tkinter – Creating GUI widgets – Resizing – Configuring widget options – Creating Layouts – Radio buttons – Check boxes – Dialog boxes – Drawing using Turtle

TOTAL PERIODS: 45

TEXTBOOKS:

1. Martin C. Brown, “The Complete Reference - Python”, Tata McGraw Hill Indian Edition, 2010. (UNIT 1-4)
2. Alan D. Moore Python GUI programming with Tkinter: Design and build functional and user-friendly GUI applications,2021. (Unit-5)
3. Ashok Namdev Kamthane, Amit Ashok Kamthan, “Programming and problem solving with Python, Second Edtion,Mc Graw Hill, 2020 (Unit 1-5)

REFERENCES

1. Wesley J Chun, -Core Python Applications Programming, Prentice Hall, 2012. Eric Matthes, “A Hands-On, Project-Based Introduction to Programming”, 2nd Edition,2019.

ONLINE/ NPTEL COURSES:

1. Programming, Data Structures and Algorithms using Python- https://nptel.ac.in/courses/106106145
2. The Joy of Computing using Python-https://nptel.ac.in/courses/106106182 Python for Data Science- https://nptel.ac.in/courses/106106212

PRACTICE EXERCISES:

1. Identify and solve simple real-life/scientific/technical problems. (Electricity Billing, Retail shop billing, Sin series, etc).
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).

3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists and tuples.
5. Implementing real-time/technical applications using Sets and dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets &Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of a shape)
7. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)
8. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
9. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age, validity, student mark range validation)
10. Exploring Pygame tool. Developing a game activity using Pygame, like bouncing ball, car race, etc.

Course Outcome

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

CO1	Understand Python's basic concepts, data types, variables, and control statements.	Understand(K2)
CO2	Understand the components of Python programming and storage statements.	Understand(K2)
CO3	Understand the functions, modules, packages, and interfaces in Python.	Apply(K3)
CO4	Understand the exception handling techniques and file operations.	Apply(K3)
CO5	Develop an application using GUI toolkits and widgets.	Apply(K3)

CO-PO/PSO MAPPING - PROBLEM SOLVING USING PYTHON

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

25UCSI15 - PROBLEM SOLVING USING PYTHON

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

25UECP16	BASIC ELECTRONICS ENGINEERING LAB	Category	L	T	P	Credit
		ES	0	0	2	1

Course Prerequisite: Nil

Course Objective:

- To design and analyze electronic circuits such as diodes, rectifiers, Zener diode, BJT, FET. To verify the basic logic operations and simple arithmetic circuits using logic gates.

LIST OF EXPERIMENTS

1. Measurement of different signal parameters using oscilloscope.
2. V-I characteristics of an ordinary p-n junction diode.
3. Full wave rectifier, with and without filter.
4. Half-wave rectifier and observe output waveform and measure ripple
5. Zener diode as a voltage regulator.
6. Input and output characteristics of BJT. (CE, CB)
7. Input and output characteristics of FET.
8. Op-Amp based inverting and non-inverting amplifier.
9. Op-Amp based differentiator and integrator.
10. Op-Amp based adder and subtractor.
11. 555 timer A stable and Monostable
12. RC phase shift oscillator

Total Periods:30

Course Outcomes:

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

CO1	Understand the characteristics of basic electronic devices. Apply problem-solving skills, recognize and utilize the characteristics of diodes, rectifiers & transistors.	Apply (K3)
CO2	Interpret the Op-Amp-based inverting and non-inverting amplifier circuit.	Apply (K3)
CO3	Integrate diverse applications of Op-Amp in differentiator, integrator.	Apply (K3)
CO4	Interpret Op-Amp based inverting adder and subtractor	Apply (K3)
CO5	Interpret RC phase shift oscillator	Apply (K3)

CO-PO/PSO MAPPING - BASIC ELECTRONICS ENGINEERING LAB												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	3	2	3	2	-	1	1	-	3	-	-
CO2	3	2	3	2	3	2	-	1	1	-	3	-	-
CO3	3	2	3	2	3	2	-	1	1	-	3	-	-
CO4	3	2	3	2	3	2	-	2	1	-	3	-	-
CO5	3	3	3	2	3	2	-	3	1	3	3	-	-

25UECP16 - BASIC ELECTRONICS ENGINEERING LAB

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

25UGEP17	FABRICATION LAB	Category	L	T	P	Credit
		ES	0	0	2	1

Course Prerequisite : NIL

Course Objective

To practice the usage of various tools towards the assembly and disassembly of different items/equipment and modern computer tools and advanced manufacturing/fabrication processes.

LIST OF EXPERIMENTS

(A). Dis-assembly & Assembly Practices

i. Tools and its handling techniques.
ii. Dis-assembly and assembly of home appliances – Grinder Mixer Grinder, Ceiling Fan, Table Fan & Washing Machine.
iii. Dis-assembly and assembly of Air-Conditioners & Refrigerators.
iv. Dis-assembly and assembly of a Bicycle.

(B). Welding Practices

i. Welding Procedure, Selection & Safety Measures.
ii. Power source of Arc Welding – Gas Metal Arc Welding & Gas Tungsten Arc Welding processes.
iii. Hands-on session of preparing base material & Joint groove for welding.
iv. Hands-on session of MAW, GMAW, GTAW, on Carbon Steel & Stainless Stell plates/pipes, for fabrication of a simple part.

(C)Electrical Wiring Practices

i. Electrical Installation tools, equipment & safety measures.
ii. Hands-on session of basic electrical connections for Fuses, Miniature Circuit Breakers and Distribution Box,
iii. Hands-on session of electrical connections for Lighting, Fans, Calling Bells.
iv. Hands-on session of electrical connections for Motors & Uninterruptible Power Supply.

(D)Electronics Components / Equipment Practices

i. Electronic components, equipment & safety measures.
ii. Dis-assembly and assembly of Computers.
iii. Hands-on session of Soldering Practices in a Printed Circuit Breaker.
iv. Hands-on session of Bridge Rectifier, Op-Amp and Transimpedance amplifier.
v. Hands-on session of integration of sensors and actuators with a Microcontroller.
vi. Demonstration of Programmable Logic Control Circuit.

(E). Contemporary Systems

i. Demonstration of Solid Modelling of components.
ii. Demonstration of Assembly Modelling of components.\
iii. Fabrication of simple components/parts using 3D Printers.
iv. Demonstration of cutting of wood/metal in different complex shapes using Laser Cutting Machine.

Total Periods:30

Course Outcomes: On the successful completion of the course, students will be able to		
CO1	Assemble and disassemble various items/equipment.	Understand (K2)
CO2	Make simple parts using suitable welding processes.	Apply (K3)
CO3	Set up wiring of distribution boards, machines, etc.	Apply (K3)
CO4	Utilize the electronic components to fabricate simple equipment, aided with sensors and actuators.	Apply (K3)
CO5	Take advantage of modern manufacturing practices	Apply (K3)

CO-PO/PSO MAPPING - FABRICATION LAB

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

25UGEP17 - FABRICATION LAB

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

25UGEP18	DESIGN THINKING AND IDEA LAB	Category	L	T	P	Credit
		ES	0	0	2	1

Course Prerequisite

- Basic Knowledge of Science and interest in creative problem solving

Course Objective

- To introduce students to the principles, methodologies, and frameworks of design thinking for solving real-world problems. To cultivate user-centric, empathetic, and creative thinking through experiential learning and hands-on activities.

Syllabus

UNIT I FUNDAMENTALS OF DESIGN THINKING (6 Hours)

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, the need of design thinking; An approach to design thinking**,** Design thinking Process model, Design thinking tools.

Case Studies: General, Engineering and Service applications

Activities: Identify Opportunity and Scope of the Project. Explore the possibilities and prepare a design brief

UNIT II: EMPATHIZE AND DEFINE (6 Hours)

Design thinking phases, how to empathize, Role of empathy in design thinking, the purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools: Customer Journey Map, Personas.

Define- Methods of Define Phase: Storytelling, Critical items diagrams, Define success

Activities: Apply the methods of empathizing and Define Phases Finalize the problem statement

UNIT III IDEATION (6 Hours)

Challenges in idea generation, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method**,** Create Thinking**,** Generating Design Ideas**,** Lateral Thinking**,** Analogies**,** Brainstorming**,** Mind mapping**,** National Group Technique**,** Synectic's**,** Development of work**,** Analytical Thinking**,** Group Activities. Ideation Tools: How Might We? (HMW), Storyboard, Brainstorming. What is design innovation? A mindset for innovation**,** and asking "What if?" asking "What wows?" and "What works?"

Activities- Apply the methods of Ideate Phase: Generate Lots of Ideas

UNIT IV PROTOTYPING (6 Hours)

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype.

Activities: Apply the Methods of the Prototype Phase: Create prototypes for selected ideas

UNIT V TESTING PROTOTYPES (6 Hours)

Prototyping for digital products: What's unique for digital products, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users. Create a Pitch-Plan for scaling up-Road map for Implementation, Fine-tuning and

Submission of the project report

Activities: Collect feedback; iterate and improve ideas

Present your solution using the Storytelling method

Total Periods:30

TEXTBOOKS:

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd.
2. IdrisMootee, Design Thinking for Strategic Innovation,2013, John Wiley & Sons Inc

REFERENCE BOOKS

1. Peter G. Rowe, Design Thinking: Understanding How Designers Think and Work, MIT Press, 1991.
2. Don Norman, The Design of Everyday Things, Basic Books, 2013.
3. Tom Kelley and David Kelley, Creative Confidence: Unleashing the Creative Potential within Us All, Crown Business, 2013.
4. Todd Zaki Warfel, Prototyping: A Practitioner's Guide, Rosenfeld Media, 2009.
5. Clive L. Dym, Patrick Little, Elizabeth J. Orwin, Engineering Design: A Project-Based Introduction, Wiley, 2011.
6. Karl T. Ulrich and Steven D. Eppinger, Product Design and Development, McGraw-Hill Education, 2015.
7. Charles Platt, Make: Electronics: Learning Through Discovery, Maker Media, 2011.

Course Outcome

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

CO1	Understand the fundamentals of design thinking, including its origin, process models, and tools, and apply them to identify opportunities and develop a design brief.	Understand (K2)
CO2	Apply empathy tools and defining methods to understand user needs and formulate clear problem statements in design thinking.	Apply (K3)
CO3	Generate creative and innovative ideas using ideation techniques such as brainstorming, mind mapping, and lateral thinking.	Apply (K3)
CO4	Apply prototyping techniques to translate ideas into tangible models through iterative development of low-fidelity prototypes.	Apply (K3)
CO5	Interpret feedback from prototype testing and iteratively improve the design to better align with user needs.	Analyze (K4)

CO-PO/PSO MAPPING - DESIGN THINKING AND IDEA LAB												
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	3	–	–	–	–	–	1	2	2	1	1
CO2	2	3	3	–	–	2	–	1	2	2	2	1	1
CO3	2	3	3	–	–	2	–	1	2	2	–	1	1
CO4	2	2	3	2	2	–	–	2	2	3	2	1	1
CO5	2	3	3	1	2	1	2	1	2	–	3	1	1

25UGEP18 - DESIGN THINKING AND IDEA LAB

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

25UPCE11	CAREER DEVELOPMENT SKILLS	Category	L	T	P	Credit
		EEC	0	0	2	0

Prerequisite: Basic communication skills and foundational knowledge of workplace behaviour

Preamble/ Course Objective

To empower students with the skills for self-discovery, goal achievement, effective time management, and personal effectiveness, alongside foundational knowledge in career planning, emotional intelligence, higher education, competitive exams, and entrepreneurship

SYLLABUS

UNIT1 **(6 Hours)**

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

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

UNIT 2 **(6 Hours)**

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

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

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

UNIT 3 **(6 Hours)**

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

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

UNIT 4 **(6 Hours)**

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

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

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

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

UNIT 5 **(6 Hours)**

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

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

Total Hours:30

Text Book

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

Reference Book

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

Course Outcome

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

CO1	Help students assess themselves, explore career options, and set actionable goals through structured planning.	Apply (K3)
CO2	Develop motivation, enhance personality effectiveness, and instil discipline for personal and professional growth.	Apply (K3)
CO3	Build awareness and practice of grooming, hygiene, positive attitudes, manners, and professional behavior.	Apply (K3)
CO4	Strengthen self-awareness, time and stress management, and emotional intelligence for balanced personal development.	Apply (K3)
CO5	Introduce students to higher education paths, competitive exams, and the fundamentals of entrepreneurship and business planning	Apply (K3)

CO-PO/PSO MAPPING - CAREER DEVELOPMENTSKILLS

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

25UMCC11	IKS – CONCEPTS AND APPLICATIONS IN ENGINEERING AND SCIENCE	Category	L	T	P	Credit
		MCC	1	0	1	0

Course Prerequisite

- Basic understanding of science and engineering fundamentals

Course Objective

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

Syllabus

UNIT I INTRODUCTION TO INDIAN KNOWLEDGE SYSTEMS

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

UNIT II: MATHEMATICS AND ASTRONOMY IN ANCIENT INDIA

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

UNIT III: METALLURGY, MATERIALS, AND ARCHITECTURE

Ancient Indian metallurgy: Iron pillar of Delhi, Wootz steel - Traditional building materials and techniques -Architectural marvels: Structural engineering principles - Water harvesting and management systems - Sustainable construction practices.

UNIT IV: RENEWABLE ENERGY AND CLIMATE CHANGE

Ayurveda: Principles and scientific validation - Traditional agricultural practices and crop management – Biodiversity conservation methods - Food preservation techniques - Biotechnology applications in traditional practices

UNIT V: INTEGRATION WITH MODERN SCIENCE AND TECHNOLOGY

Validating traditional knowledge through modern scientific methods - Case studies of successful IKS-modern science integration - Intellectual property and traditional knowledge protection - Research opportunities and career prospects - Future directions and challenges

TEXTBOOKS:

1. Subhash Kak, "The Nature of Physical Reality", Mount Meru Publishing, 2016
2. B.V. Subbarayappa, "Indian Astronomy: A Source Book", Nehru Centre, 2008
3. Kapila Vatsyayan, "Traditional Indian Art and Culture", Cambridge University Press, 2015

REFERENCE BOOKS & WEB RESOURCES

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

5. CSIR Traditional Knowledge Digital Library - www.tkdl.res.in		
Course Outcome On the successful completion of the course, students will be able to		
CO1	Understand the historical development and scientific basis of Indian Knowledge Systems	Understand (K2)
CO2	Analyze traditional Indian practices in mathematics, astronomy, metallurgy, and medicine	Analyze (K4)
CO3	Apply IKS principles to contemporary engineering and scientific problems	Apply(K3)
CO4	Evaluate the sustainability aspects of traditional Indian technologies	Evaluate (K5)
CO5	Create innovative solutions by integrating traditional knowledge with modern science	Create (K6)

CO-PO/PSO MAPPING - IKS – CONCEPTS AND APPLICATIONS IN ENGINEERING AND SCIENCE												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	2	1	-	-	1	-	2	1	2	1	3	-	-
CO2	3	2	2	1	2	-	1	1	2	2	3	-	-
CO3	3	3	2	2	2	1	2	2	2	2	2	-	-
CO4	2	2	2	2	3	2	3	2	3	3	3	-	-
CO5	3	3	3	3	3	2	2	2	3	3	2	-	-

25UMCC12	HOLISTIC WELLNESS	Category	L	T	P	Credit
		MCC	0	0	2	0

Course Prerequisite: Nil

Course Objective

- Foundational concepts of holistic wellness, emphasizing the integration of physical, mental, emotional, and internal well-being. Create a balanced lifestyle that promotes overall health and happiness through practical activities.
- Explore advanced techniques in mental, emotional, and spiritual well-being, with an emphasis on creating sustainable wellness habits.

Syllabus

UNIT I INTRODUCTION TO HOLISTIC AND PHYSICAL WELLNESS

Overview of holistic wellness: physical, mental, emotional, and internal health- The importance of balance in overall well-being. Importance of physical activity and exercise- Understanding nutrition and its role in health- Sleep hygiene and its impact on well-being.

Hands-on activity: Self-assessment of current wellness status. Designing a personalized fitness and nutrition plan

UNIT II: MENTAL AND EMOTIONAL WELLNESS:

Stress management techniques- The role of Yoga, mindfulness and meditation in mental health- Emotional intelligence and its impact on relationships.

Hands-on activity: Practicing Yoga, mindfulness and emotional regulation exercises.

UNIT III: INTEGRATING WELLNESS PRACTICES:

Combining physical, mental, emotional, and Internal wellness practices into daily life - Developing a balanced wellness plan.

Hands-on activity: Creating a comprehensive personal wellness plan.

UNIT IV: EMOTIONAL RESILIENCEAND ADVANCED MINDFULNESS

Deepening mindfulness practices for enhanced mental clarity- Exploring different forms of meditation (e.g., guided, transcendental, movement-based). Building emotional resilience through positive psychology practices- Cognitive-behavioural strategies for managing stress and anxiety.

Hands-on activity: Developing and practicing a resilience toolkit. Daily meditation practice and journaling reflections.

UNIT V: INTERNAL GROWTH AND SUSTAINING WELLNESS PRACTICES:

Exploring the deeper aspects of internal wellness and self-actualization- Reflective practices for discovering life purpose and meaning. Strategies for maintaining wellness habits over the long term- Adapting wellness plans to life changes and challenges-

Hands-on activity: Revising and finalizing a long-term personal wellness plan. Creating a vision board or personal mission statement

TEXTBOOKS:

1. Jayanna, Krishnamurthy., Science & Practice of Integrative Health & Wellbeing Lifestyle., White Falcon Publishing (2020).
2. Rosenberg, Marshall Bertram., Nonviolent Communication: A Language of Life., Puddle Dancer Press, Encinitas, CA (2015).
3. Patel, Kamlesh. Heartfulness Way: Heart-Based Meditations for Spiritual Transformation, Kamlesh Patel, 2018.

REFERENCE BOOKS

1. B.K.S Iyengar., Yoga: The Path to Holistic Health., Dorling Kindersley Limited, City of Publication (2001)
2. Goleman Daniel., Emotional Intelligence., Bloomsbury India, India, (2021).
3. James Allen., As a Man Thinketh., Maple Press, Noida, (2010)
4. Swami Budhanandha., Will power and its development., Advaita Ashrama Mayavati, Pithoragarh, Himalayas from its Publication Department, Calcutta. (2001)

5. KalderdonAdizesIchak., What Matters in Life: Lessons I Learned from Opening My HeartWS Press, Newtown, PA (2023)
6. Jayanna, Krishnamurthy., Science & Practice of Integrative Health & Wellbeing Lifestyle., White Falcon Publishing (2020).
7. Lipton, Bruce., The Biology of Belief 10th Anniversary Edition: Unleashing the Power of Consciousness, Matter & Miracles, Hay House, Carlsbad (2015).

WEB RESOURCES

1. Learning Suryanamskar
2. Yoga for well-being
3. Nutritional Educational contents
4. Introduction to Psychology
5. Guided Meditation
6. Simplified physical exercises instructions
7. Simplified Physical Exercises
8. Life skills and value education
9. James Allen Library

Course Outcome

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

CO1	Understand the basic principles of holistic wellness. Apply strategies for maintaining physical health, including nutrition and exercise	Apply (K3)
CO2	Practice mindfulness techniques to enhance mental and emotional well-being.	Analyze (K4)
CO3	Develop a personal wellness plan incorporating various aspects of holistic health.	Apply (K3)
CO4	Apply advanced techniques in mindfulness, meditation, and stress management.	Evaluate (K5)
CO5	Develop resilience and adaptability in maintaining wellness. Refine and sustain a personalized holistic wellness plan.	Create (K6)

CO-PO/PSO MAPPING - HOLISTIC WELLNESS

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

SEMESTER II							
S.No	**Course Code**	**Course Title**	**category**	**L**	**T**	**P**	**Credits**
THEORY COURSES							
1.	25UMAT21	Differential Equations and Transforms	BS	3	1	0	4
2.	25UCST22	Computer Organization and Architecture	PC	3	0	0	3
3.	25UPHT23	Applied Physics for Computing Engineers	BS	3	0	0	3
4.	25UECT24	Digital System Design	ES	2	1	0	3
INTEGRATED COURSES							
5.	25UCSI26	Programming in C	ES	3	0	2	4
6	25UHSI26	Professional Communication for Engineers	HS	1	0	4	3
PRACTICAL COURSES							
7	25UPHP27	Applied Physics Lab	BS	0	0	2	1
8	25UECP28	Digital System Design Lab	ES	0	0	2	1
9	25UGEP29	Engineering Graphics and Auto CAD Lab	ES	0	0	2	1
EMPLOYABILITY ENHANCEMENT COURSES							
10	25UPCE21	Communication Skills	EEC	0	0	2	0
11	25UCCC21	Certification Course 1	CCC	0	0	0	0
MANDATORY COURSES							
12	25UMCC21	IKS in Humanities and Social Science	MCC	1	0	1	0
13	25UMCC22	Environmental Science& Sustainability	MCC	0	0	2	0
Total							**23**

25UMAT21	DIFFERENTIAL EQUATIONS AND TRANSFORMS	Category	L	T	P	Credit
		BS	3	1	0	4

Course Prerequisite

- Engineering Mathematics-I

Course Objective

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

SYLLABUS

UNIT I ORDINARY DIFFERENTIAL EQUATIONS (12 Hours)

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

UNIT II PARTIAL DIFFERENTIAL EQUATIONS (12 Hours)

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

UNIT III LAPLACE TRANSFORM (12 Hours)

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.

UNIT IV INVERSE LAPLACE TRANSFORM (12 Hours)

Inverse Laplace Transforms – Properties, Convolution theorem, Application - Solution of ordinary differential equations with constant coefficients -Solution of simultaneous ordinary differential equations.

UNIT V FOURIER TRANSFORM (12 Hours)

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

TOTAL PERIODS:60

TEXTBOOKS:

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

REFERENCE BOOKS:

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

ONLINE COURSES/NPTEL/SWAYAM:

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

Course Outcome

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

CO1	Solve higher order differential equations	Apply(K3)
CO2	Formulate and solve various types of partial differential equations	Apply (K3)
CO3	Apply Laplace transforms and initial and final value theorems to solve engineering problems involving step, impulse and periodic functions.	Apply(K3)
CO4	Apply Laplace transforms to solve ordinary differential equations with constant coefficients and simultaneous ordinary differential equations	Apply(K3)
CO5	Apply Fourier transform techniques, including Fourier integral theorem, properties of Fourier transforms, convolution, and Parseval's identity	Apply(K3)

CO-PO/PSO MAPPING - DIFFERENTIAL EQUATIONS AND TRANSFORMS

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

25UMAT21 - DIFFERENTIAL EQUATIONS AND TRANSFORMS

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

25UCST22	COMPUTER ORGANIZATION AND ARCHITECTURE	Category	L	T	P	Credit
		PC	3	0	0	3

Course Prerequisite:

- Computational Thinking

Course Objective:

- To learn the basic components of computer, instruction set architecture, memory hierarchy, Input Output Operations, basic processing concept and Pipelining.

SYLLABUS

UNIT 1 BASIC STRUCTURE OF COMPUTER &ISA (9 Hours)

Computer Types - Functional Units –Basic operational Concepts – Memory Location and Addresses-Instruction and Instruction sequencing-Addressing Modes-IA32 Registers –IA32 Addressing –IA 32 instructions-Program flow control –Logic and shift rotate operations.

UNIT-II INPUT OUTPUT ORGANIZATION (9 Hours)

Accessing I/O Devices-Interrupts-Hardware-Enabling and Disabling Interrupts-Handling Multiple Devices-Exceptions-Direct Memory Access-Buses-Synchronous Bus –Asynchronous Bus-Standard I/O interfaces

UNIT-III MEMORY SYSTEM (9 Hours)

Basic Concepts – RAM memory-Internal organization of Memory Chip-Static Memory – Dynamic Memory-Read Only Memory –Memory Hierarchy-cache memory-Mapping Functions-Replacement Algorithms-Performance Considerations-Virtual Memory-Secondary Storage.

UNIT-IV BASIC PROCESSING UNIT (9 Hours)

Fundamental Concepts-Execution of Complete Instruction-Multiple Bus Organization-Hardwired Control-Micro programmed control-Microinstructions-Micro program sequencing-wide branch addressing.

UNIT-V PIPELINING (9 Hours)

Basic Concepts – Data Hazard – Instruction Hazard-Influence on Instruction Set- Datapath and Control Considerations – Superscalar Operations.

TOTAL PERIODS:45

TEXTBOOKS:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization “, Fifth Edition, Tata McGraw-Hill, 2011.

REFERENCES

1. M. Morris Mano, “Digital Logic and Computer Design”, Pearson Education, 2016
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”Tenth Edition, Pearson Education, 2016.
3. David A.Patterson and John L.Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Elsevier,5th Edition, 2014.

WEB RESOURCES:

1. Introduction to Computer Systems and its sub modules: https://nptel.ac.in/courses/106103068

2. Computer Organization and Architecture: https://nptel.ac.in/courses/106106166
3. Computer Organization and Architecture A Pedagogical Aspect: https://nptel.ac.in/courses/106103180

Course Outcome

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

CO1	Infer the functional units of computer and basic operations, studying about IA 32 Registers and Addressing modes, Shift/Rotate Instructions.	Understand (K2)
CO2	Discuss about the Accessing of I/O Devices, Interrupt working principles, Use Of Interrupts in Operating Systems, Pentium Interrupt Structure, Direct Memory Access, Busses, Standard I/O Interfaces.	Understand (K2)
CO3	Discuss the Basic Concepts of memory system, Semiconductor RAM Memories, Read-Only Memories, Memory Hierarchy, Cache Memories, Performance Considerations, Virtual memory, Secondary Storage.	Understand (K2)
CO4	Infer Some Fundamental Concepts of processing unit,Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Micro programmed Micro program Control	Understand (K2)
CO5	Interpreting the Pipelining Concepts, Data Hazards, Instruction Hazards, Influence On Instructions Sets, Data path and Control Considerations, Superscalar Operations, Performance Considerations	Understand (K2)

CO-PO/PSO MAPPING –COMPUTER ORGANIZATION AND ARCHITECTURE

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

25UCST22 - COMPUTER ORGANIZATION AND ARCHITECTURE

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

25UPHT23	APPLIED PHYSICS FOR COMPUTING ENGINEERS	Category	L	T	P	Credit
		BS	3	0	0	3

Course Prerequisite

- Solid-state physics basics, Atomic models and bonding, Semiconductor theory.

Course Objective:

- To make the students understand the importance in studying electrical properties of materials, semiconductor physics, wave function in quantum mechanics and its practical application in technologies. To inculcate an idea of the significance of nanostructures, quantum confinement, ensuing nano device applications and quantum computing.

SYLLABUS

UNIT I ELECTRICAL PROPERTIES OF MATERIALS (9 Hours)

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential: Bloch theorem – metals and insulators - Energy bands in solids– tight binding approximation - Electron effective mass – concept of hole.

UNIT II SEMICONDUCTOR PHYSICS (9 Hours)

Intrinsic Semiconductors – Energy band diagram – direct and indirect semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in Ntype& P-type semiconductors – Carrier transport: Velocity-electric field relations – drift and diffusion transport - Einstein's relation – Hall effect and devices – Zener and avalanche breakdown in p-n junctions - Ohmic contacts – tunnel diode - Schottky diode – MOS capacitor - power transistor.

UNIT III QUANTUM PHYSICS (9 Hours)

De Broglie hypothesis of matter waves; properties of matter wave; Wave function; Physical interpretation of wave function; Heisenberg uncertainty principle; non existence of electron in nucleus; Schrodinger 's time dependent wave equation; time independent wave equation; Particle trapped in one dimensional infinite potential well, – tunneling (qualitative) - scanning tunneling microscope, Quantum Computing.

UNIT IV OPTICAL PROPERTIES OF MATERIALS (9 Hours)

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and Semiconductors (concepts only) - photo current in a P- N diode – solar cell –photo detectors - LED – Organic LED – Laser diodes – excitons - quantum confined Stark effect – quantum dot laser.

UNIT V NANODEVICES AND QUANTUM COMPUTING (9 Hours)

Introduction - quantum confinement– quantum structures:quantum wells, wires and dots — band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade- resonant-tunneling diode – single electron transistor – quantum cellular automata - Quantum system for information processing - quantum states – classical bits – quantum bits or qubits – CNOT gate - multiple qubits – Bloch sphere –quantum gates – advantage of quantum computing over classical computing

TOTAL PERIODS: 45

TEXTBOOKS

1. Umesh K Mishra & Jasprit Singh, "Semiconductor Device Physics and Design", Springer, 2008.
2. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.
3. Kasap, S.O. "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007
4. Bhattacharya, D.K. & Poonam, T. ―Engineering Physics‖. Oxford University Press, 2015.
5. Jasprit Singh, ―Semiconductor Devices: Basic Principles, Wiley 2012.

Garcia, N. & Damask, A. ―Physics for Computer Science Students‖. Springer-Verlag, 2012

REFERENCES

1. Charles Kittel, Introduction to Solid State Physics, WileyIndiaEdition,2019.
2. Y.B.Band and Y. Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.
3. V.V. Mitin, V.A.Kochelap and M.A.Stroscio ,Introduction to Nanoelectronics, Cambridge Univ. Press, 2008.G.W.Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009

Course Outcome

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

CO1	Understand the effect of periodic potentials on electron motion using Bloch's theorem, and distinguish between metals, semiconductors, and insulators based on electronic band structure.	Understand (K2)
CO2	Relate theoretical principles to real-world applications in electronics and IT hardware, fostering the ability to choose and apply suitable semiconductor devices in practical systems.	Understand (K2)
CO3	Understand and explain the properties of matter waves and particles in a one-dimensional infinite potential well and understand the quantization of energy levels.	Understand (K2)
CO4	Understand the basic mechanisms of light absorption, emission, and scattering in various materials. Explore the function of photo detectors and their application in light-sensing technologies.	Understand (K2)
CO5	Understand classical bits and quantum bits (qubits), and understand their representation using quantum states. Apply basic quantum logic gates, such as the CNOT gate, and explore multi-qubit operations.	Understand (K2)

CO-PO/PSO MAPPING - APPLIED PHYSICS FOR COMPUTING ENGINEERS													
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	3	3	-	-	2	-	-	-	-	2	-	-
CO2	3	3	3	-	-	2	-	-	-	-	2	-	-
CO3	3	3	3	-	-	2	-	-	-	-	2	-	-
CO4	3	3	3	-	-	2	-	-	-	-	2	-	-
CO5	3	3	3	-	-	2	-	-	-	-	2	-	-

25UPHT23 - APPLIED PHYSICS FOR COMPUTING ENGINEERS

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

25UECT24	DIGITAL SYSTEM DESIGN	Category	L	T	P	Credit
		ES	2	1	0	3

Course Prerequisite

- Basic knowledge on electronic devices

Course Objective

- To design combinational logic circuits and Sequential logic circuits, including multiplexers, decoders, encoders, adders, subtractors, flip-flops and Latches. To learn the basics of IoT devices and types of boards.

SYLLABUS

UNIT-I BASIC CONCEPTS (9 Hours)

Number System: Binary Number Representations – Signed Numbers and Complements, Unsigned, Fixed Point, and Floating-Point numbers. Addition and subtraction with 1‘s and 2‘s complements. Codes for detecting and correcting errors: Even and Odd parity codes

UNIT-II BOOLEAN ALGEBRA (9 Hours)

Boolean Algebra: Basic theorems- Postulates- Duality – Boolean Function- Canonical form- Standard form. Simplification of Boolean Function: Karnaugh Map Method. Basic Theorems - Simplification of K-map functions.

UNIT – III COMBINATIONAL LOGIC DESIGN (9 Hours)

Combinational Logic Design: Half adder - Full adder– Parallel Adder- Carry Look Ahead Adder – BCD Adder – Magnitude Comparator – Encoders and Decoders – Multiplexers – Code converters – Parity generator, Parity checker.

UNIT – IV SEQUENTIAL CIRCUITS (9 Hours)

Sequential Circuits: General model of sequential circuits –latches – Master-slave Configuration- Flip-Flops - Concept of State – State diagram – State Table. Design of Synchronous counters- Asynchronous counters- Shift Register- PN Sequence generator.

UNIT – V PROGRAMMABLE LOGIC DEVICES (9 Hours)

Programmable Logic Devices: PROM – EPROM – EEPROM- Programmable Logic Array (PLA) – Programmable Array Logic (PAL) -Realization of combinational circuits using PROM, PLA, and PAL.

TOTAL PERIODS: 45

TEXTBOOK(S)

1. M. Morris Mano and Michael D. Ciletti, Digital Design: With an Introduction to the Verilog HDL and System Verilog, 2018, 6th Edition, Pearson Pvt. Ltd.

REFERENCE BOOKS

1. Ming-Bo Lin, Digital Systems Design and Practice: Using Verilog HDL and FPGAs, 2015, 2nd Edition, Create Space Independent Publishing Platform.
2. Samir Palnitkar, Verilog HDL: A Guide to Digital Design and Synthesis, 2009, 2nd edition, Prentice Hall of India Pvt. Ltd.
3. Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with Verilog Design, 2013, 3rd Edition, McGraw-Hill Higher Education.

ONLINE/ NPTEL COURSES:

1. Digital Circuits: https://onlinecourses.nptel.ac.in/noc23 ee115
2. Digital Circuits Design: https://onlinecourses.nptel.ac.in/noc22 ee110
3. Microelectronics: Devices to Circuits: https://nptel.ac.in/courses/108107142

Course Outcome

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

CO1	Understand the application of number representation and basic codes.	Understand(K2)

CO2	Understand Boolean algebra and its foundational theorems and use of the Karnaugh map simplification.	Understand(K2)
CO3	Design and analyse Combinational Logic Design and Programmable Logic Devices.	Analyse(K4)
CO4	Design and construct Combinational Logic circuits and Synchronous Sequential Circuits.	Analyse(K4)
CO5	Design and implement combinational logic circuits using PROM, PLA, and PAL	Apply(K3)

CO-PO/PSO MAPPING - DIGITAL SYSTEM DESIGN												
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	3	2	-	-	-	-	-	-	-	2	1	-
CO2	3	3	3	2	-	-	-	-	-	-	2	1	-
CO3	3	3	3	2	2	-	-	-	-	-	2	1	-
CO4	3	3	3	2	2	-	-	-	-	-	2	1	-
CO5	3	2	3	-	2	-	-	-	-	-	2	1	-

25UECT24 -DIGITAL SYSTEM DESIGN

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

25UCSI26	PROGRAMMING IN C	Category	L	T	P	Credit
		ES	3	0	2	4

Course Prerequisite

- Basic programming skills.

Course Objective

- To impart the knowledge of basic programming constructs of C language, arrays and strings, functions, structures, pointers and input/output file handling.

Syllabus

UNIT I INTRODUCTION TO PROGRAMMING PARADIGMS: (9 Hours)

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

UNIT II DECISION MAKING, ARRAYS AND STRINGS (9 Hours)

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

UNIT III FUNCTIONS AND POINTERS (9 Hours)

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

UNIT IV STRUCTURES AND UNION (9 Hours)

Structure – Nested structures – Pointer and Structures – Array of structures – Self-referential structures – typedef – Union – Storage classes and Visibility.

UNIT V FILE MANAGEMENT AND DYNAMIC MEMORY ALLOCATION: (9 Hours)

Files- Types of file processing, I/O Operations of File, Random access file, Command line arguments, Dynamic memory allocation – malloc, calloc, free, Pre-processor directive, Macro substitution, Compiler control directive.

TOTAL PERIODS: 45

TEXTBOOKS:

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

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel, “C How to Program with an Introduction to C++”, 8th edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, 2nd Edition, Oxford University Press, 2013.
4. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, 1st Edition, Pearson Education, 2013

ONLINE/ NPTEL COURSES:

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

Course Outcomes:

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

CO1	Demonstrate knowledge on C Programming constructs and develop simple program in C using basic constructs.	Understand (K2)
CO2	Apply arrays and string operations to solve basic problems using C	Apply (K3)
CO3	Develop modular programs using functions, recursion, and pointers	Apply (K3)
CO4	Implement user-defined data types using structures, unions, and manage memory dynamically.	Apply (K3)
CO5	Implement file operations and manage memory dynamically using pointers and preprocessor directives.	Apply (K3)

PRACTICE EXERCISES:

1. Study of Compilation and execution of simple C programs
2. Simple computational problems using arithmetic expressions (Arithmetic Operations, Area &circumference of a circle)
3. Problems involving if-then-else structures (ODD/EVEN numbers, Greatest Numbers)
4. Iterative problems e.g., sum of series (Factorial, Sum of Digits)
5. 1D and 2D, multi-dimensional arrays, traversal
6. Matrix problems, String operations (Addition, Subtraction, Multiplication, Palindrome String Operations, String Handling Functions)
7. Simple functions (nCr Program, Swapping using call-by-reference)
8. Programming for solving Numerical methods problems (Palindrome Checking, Searching and Sorting Names)
9. Recursive functions (Factorial using Recursion)
10. Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
11. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
12. Files: reading and writing, File pointers, file operations, random access, pre-processor directives

TOTAL PERIODS: 15

CO-PO/PSO MAPPING - PROGRAMMING IN C												
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	2	1	2	–	–	–	2	–	1	3	1
CO2	3	2	3	2	2	–	–	–	1	–	1	3	1
CO3	3	2	3	3	2	–	–	–	2	–	1	3	1
CO4	3	2	3	3	3	–	–	–	2	–	1	3	1
CO5	3	2	3	2	3	–	–	–	2	–	1	3	1

25UCSI26 - PROGRAMMING IN C

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

25UHSI26	PROFESSIONAL COMMUNICATION FOR ENGINEERS	Category	L	T	P	Credit
		HS	1	0	4	3

Course Prerequisite:
Basics of English Language

Course Objective:

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

SYLLABUS

UNIT I INTRODUCTION TO COMMUNICATION (3 Hour)

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

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

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

(**12Hour)**

UNIT II NARRATION AND SUMMATION (3Hour)

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

LAB ACTIVITY: Listening – Travel podcast; Speaking – Narrating and sharing personal experiences through a podcast, Autobiography of a famous Personality **(12 Hour)**

UNIT III DESCRIPTION OF A PROCESS / PRODUCT (3 Hour)

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

LAB ACTIVITY: Listening – Railway / Airport Announcements, Travel Vlogs; Speaking – Describing a place or picture description **(12Hour)**

UNIT-IV VISUALIZATION AND CLASSIFICATION **(3 Hour)**

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

LAB ACTIVITY: Picture Description, about purchasing a product, Summarizing a TED talk, Role play, Narrating an unforgettable event **(12 Hour)**

UNIT V EXPRESSION COMMUNICATION **(3 Hour)**

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

LAB ACTIVITY: Listening /Reading Comprehension, Developing a story using given Vocabulary, Mini Presentation on General topic (ICT tools), Group Discussion **(12Hour)**

THEORY PERIODS: 15
PRACTICAL PERIODS: 60

TEXTBOOKS

1. Technical Communication: Principles and Practice Meenakshi Raman & Sangeeta Sharma Oxford University Press 3rd Edition (or latest)
2. Communication Skills Sanjay Kumar & Pushp Lata, Oxford University Press, 2nd Edition (2015)
3. Effective Technical Communication*:* M. Ashraf Rizvi, McGraw-Hill Education, 2nd Edition (2017)

REFERENCE BOOK

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

Course Outcome

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

CO1	Use appropriate words in a professional context.	Understand(K2)
CO2	Gain understanding of basic grammatic structures and use them in right context.	Understand(K2)
CO3	Speak fluently and accurately in formal and informal communicative contexts	Understand(K2)
CO4	Write definitions, descriptions, narrations and essays on various topics	Understand(K2)
CO5	Express their opinions effectively in both oral and written medium of communication	Analyze(K3)

CO-PO/PSO MAPPING - PROFESSIONAL COMMUNICATION FOR ENGINEERS													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	1	1	-	-	2	-	-	-	-	3	2	-	-
CO2	1	2	-	-	2	-	-	2	-	3	2	-	-
CO3	1	2	-	-	-	-	-	1	-	3	2	-	-
CO4	1	3	-	-	3	-	1	2	-	3	2	-	-
CO5	1	2	-	-	2	-	1	3	-	3	2	-	-

25UHSI26 - PROFESSIONAL COMMUNICATION FOR ENGINEERS

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

25UPHP27	APPLIED PHYSICS LAB	Category	L	T	P	Credit
		BS	0	0	2	1

Course Prerequisite:

- Basic Programming Knowledge

Course Objective:

- To improve the knowledge about the theory learned in the class. To improve ability to analyze experimental result and write laboratory report.

LIST OF EXPERIMENTS

1. Determination of angle of divergence of a laser beam using laser.
2. Determination of particle size of lycopodium powder using semiconductor laser.
3. Determination of wavelength of laser light using semiconductor laser diffraction.
4. Determination of numerical aperture and acceptance angle in an optical fiber.
5. Determination of Dispersive power of a prism using Spectrometer.
6. Determination of wavelength of mercury spectrum – spectrometer grating .
7. Determination of band gap of a semiconductor.
8. Determination of solar cell characteristics**.**

TOTAL PERIODS: 30

Course Outcome

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

CO1	Perform the experiments based on laser and fiber optics and its characteristics.	Analyse (K4)
CO2	Perform the experiments using a spectrometer.	Analyse (K4)
CO3	Perform experiments on semiconductor devices and analyze their characteristics.	Analyse (K4)
CO4	Perform experiments on band gap of semiconductor	Analyse (K4)
CO5	Perform experiments on solar cell characteristics**.**	Analyse (K4)

CO-PO/PSO MAPPING -APPLIED PHYSICS LAB													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	2	2	2	2	-	2	-	-	1	-	2	-	-
CO2	2	2	2	2	-	1	-	-	1	-	2	-	-
CO3	2	2	2	2	-	2	-	-	1	-	2	-	-
CO4	2	2	2	2	-	1	-	-	1	-	2	-	-
CO5	2	2	2	2	-	2	-	-	2	-	2	-	-

25UPHP27- APPLIED PHYSICS LAB

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

25UECP28	DIGITAL SYSTEM DESIGN LAB	Category	L	T	P	Credit
		ES	0	0	2	1

Course Prerequisite:

- Basic Programming Knowledge

Course Objective:

- To design universal logic gates, Boolean expressions, and implement logic circuits. To design and test combinational and sequential circuits, including adders, subtractors, multiplexers, demultiplexers, flip-flops, counters, and shift registers.

LIST OF EXPERIMENTS

1. Study Of Logic Gates
2. A) Design and Implementation of Adder
   B) Design And Implementation of Subtractor
3. Design And Implementation of Binary to Gray Code and Gray to Binary.
4. Design And Implementation Of 4-Bit Binary Adder/ Subtractor and BCD Adder Using IC7483
5. Design And Implementation 4-Bit Magnitude Comparator Using Logic Gates.
6. Design And Implementation of 4:1 Multiplexer Using Logic Gates.
7. Design And Implementation of Priority Encoder.
8. Study Of Flip-Flops Using Gates
9. Design and Implementation of Ring Counter and Johnson Counter Using a Shift Register IC.
10. Design And Implementation 3-Bit Binary Up/Down Counter Using ICs.
11. Simulation Of Combinational Circuits Using LTspice Tools.
12. Design And Implementation Of 4-Bit Adder-Subtractor and BCD Adder Using IC7483

TOTAL PERIODS: 30

Course Outcome

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

CO1	Analyze and verify the functionality of basic and universal logic gates.	Understand(K2)
CO2	Simplify Boolean expressions and implement corresponding digital circuits.	Understand(K2)
CO3	Design and test combinational circuits such as adders, subtractors, multiplexers, and demultiplexers.	Understand(K2)
CO4	Construct and verify sequential circuits including flip-flops, shift registers, and counters.	Understand(K2)
CO5	Simulate and validate digital circuits using VHDL tools**.**	Understand(K2)

CO-PO/PSO MAPPING - DIGITAL SYSTEM DESIGN LAB												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	2	2	2	2	-	2	-	-	1	-	2	1	
CO2	2	2	2	2	-	1	-	-	1	-	2	1	
CO3	2	2	2	2	-	2	-	-	1	-	2	1	
CO4	2	2	2	2	-	1	-	-	1	-	2	1	
CO5	2	2	2	2	-	2	-	-	2	-	2	1	

25UECP28 - DIGITAL SYSTEM DESIGN LAB

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

25UGEP29	ENGINEERING GRAPHICS AND AUTOCAD LAB	Category	L	T	P	Credit
		ES	0	0	2	1

Course Prerequisite:

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

Course Objective:

- To develop knowledge of standard practices in engineering drawing, including lettering, line work, dimensioning, and projection techniques.
- To enable students to construct and interpret conic sections, spirals, involutes, helix curves, and projections of points, lines, planes, and solids.
- To understand the development and intersection of surfaces like cylinder-cylinder and cylinder-cone, essential for fabrication and design.
- To build skills in creating accurate isometric and orthographic projections for effective engineering communication.
- To introduce students to AutoCAD for creating 2D engineering drawings, enhancing their ability to use modern engineering tools.

LIST OF EXPERIMENTS

UNIT-I

Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning. Conic sections, Involutes, Spirals, Helix.

UNIT-II

Projection of Points, Lines and planes, Projection of Solids.

UNIT-III

Sections of solids and Development of surfaces

UNIT-IV

Isometric projections and Conversion of pictorial to Orthographic views

UNIT-V

Computer Aided Drafting: Introduction to Computer Graphics and Drafting, AutoCAD, 2-D diagrams of simple geometries using Auto- CAD script.

TOTAL PERIODS: 30

TEXTBOOKS

1. Computer Aided Drafting: Introduction to Computer Graphics and Drafting, AutoCAD,2-D diagrams of simple geometries using Auto- CAD script.

REFERENCES

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

Web Resources

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

Course Outcome On the successful completion of the course, students will be able to		
CO1	Understand and apply the principles of engineering drawing standards, including lettering, line types, dimensioning, and accurately construct conic sections, spirals, involutes, and helix curves.	Understand (K2)
CO2	Interpret and generate projections of solid objects and their sectional views, aiding in better understanding of internal features in engineering components.	Analyse(K4)
CO3	Develop the lateral surfaces of solids essential for manufacturing and fabrication processes.	Analyse(K4)
CO4	Create and interpret isometric and orthographic projections of engineering objects to effectively communicate design intent.	Analyse(K4)
CO5	Utilize computer-aided drafting tools, particularly AutoCAD, to produce accurate 2D engineering drawings of simple geometries, enhancing proficiency in modern engineering software.	Analyse(K4)

CO-PO/PSO MAPPING - ENGINEERING GRAPHICS AND AUTOCAD LAB

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

25UGEP29 - ENGINEERING GRAPHICS AND AUTOCAD LAB

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

25UPCE21	COMMMUNICATION SKILLS	Category	L	T	P	Credit
		EEC	0	0	2	0

Prerequisite: Professional Competency I

Preamble/ Course Objective: Ability to plan and manage their career paths effectively.
It focuses on developing self-assessment, goal setting, and decision-making skills.

Course objective: Students will learn to research career options and align them with personal strengths and values

Syllabus

UNIT 1: (6 Hours)

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

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

UNIT 2: (6 Hours)

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

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

UNIT 3: (6 Hours)

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

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

UNIT 4: (6 Hours)

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

Public speaking skills: Confidence and overcoming Anxiety –Effective message Delivery

SWOT Analysis: Identifying Internal Factors – Analyzing External Factors

UNIT 5: (6 Hours)

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

Active Sessions: Debate – Picture Connector

Text Book

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

Reference Book

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

Course Outcome On the successful completion of the course, the students will be able to		
CO1	Develop sustained motivation and enhance interpersonal skills for effective communication and teamwork.	Apply(K3)
CO2	Build active listening and conversation skills essential for collaborative and respectful team interactions	Apply(K3)
CO3	Strengthen reading comprehension and writing clarity through critical analysis and audience-focused expression.	Apply(K3)
CO4	Improve public speaking and presentation skills while fostering self-assessment through SWOT analysis.	Apply(K3)
CO5	Promote team collaboration and communication through practical activities like debates and group problem-solving	Apply(K3)

CO-PO/PSO MAPPING - COMMMUNICATION SKILLS												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	2	2	2	2	-	-
CO2	-	-	-	-	-	-	-	-	3	3	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO4	-	-	-	-	-	-	-	2	-	2	2	-	-
CO5	-	-	-	-	-	-	-	-	3	3	-	-	-

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25UMCC21	IKS IN HUMANITIES AND SOCIAL SCIENCE	Category	L	T	P	Credit
		MCC	1	0	1	0

Course Prerequisite:

- Basic understanding of Indian history and culture

Course Objective:

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

Syllabus

UNIT I: Philosophical Foundations of Indian Knowledge Systems **(3 Hours)**

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

UNIT II: Indian Literary and Artistic Traditions **(3 Hours)**

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

UNIT III: Social Organization and Governance **(3 Hours)**

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

UNIT IV: Educational Systems and Knowledge Transmission **(3 Hours)**

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

UNIT V: Contemporary Relevance and Applications **(3 Hours)**

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

LEARNING ACTIVITIES

Research Projects:

1. Philosophical Analysis Project
   - Study of a specific philosophical school
   - Comparison with contemporary thought
   - Presentation of findings
2. Literary Heritage Study
   - Analysis of classical texts
   - Cultural significance evaluation
   - Creative interpretation through modern media
3. Social Systems Research
   - Historical analysis of governance models
   - Contemporary applications study
   - Policy recommendation development

4. Case Study Analysis
   - Traditional knowledge applications
   - Success stories and challenges
   - Future implementation strategies

TEXTBOOKS

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

REFERENCE BOOKS

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

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

CO1	Understand the philosophical foundations and methodologies of Indian knowledge systems in the humanities.	Understand (K2)
CO2	Analyze Indian contributions to literature, arts, social organization, and governance systems	Analyze (K4)
CO3	Apply principles from Indian philosophical traditions to contemporary social and ethical issues	Apply (K3)
CO4	Evaluate the relevance and adaptability of traditional knowledge in modern social contexts	Evaluate (K5)
CO5	Create connections between ancient wisdom and contemporary challenges in society	Create (K6)

CO-PO/PSO MAPPING - IKS IN HUMANITIES AND SOCIAL SCIENCE

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

25UMCC22	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	Category	L	T	P	Credit
		MCC	0	0	2	0

Course Prerequisite:

- Basic knowledge of chemistry, biology, and physics.

Course Objective:

- Understand fundamental concepts of environmental science and ecology
- Analyze environmental problems and their engineering solutions
- Develop awareness about sustainable development and green technologies
- Explore renewable energy systems and waste management strategies
- Foster environmental consciousness and responsible engineering practices

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SYLLABUS

UNIT IINTRODUCTION TO ENVIRONMENTAL SCIENCE AND ECOLOG (6 hours)

Definition, scope and importance of environmental science - Structure and function of ecosystems - Biogeochemical cycles: Carbon, nitrogen, phosphorus, sulfur cycles - Biodiversity and its conservation - Environmental impact assessment principles.

UNIT IIENVIRONMENTAL POLLUTION AND CONTROL (6 hours)

Air pollution: Sources, effects, and control measures - Water pollution: Industrial and domestic sources, treatment methods - Soil pollution: Causes, effects, and remediation techniques - Noise pollution: Sources, effects, and control - Solid waste management: 3R principles, waste-to-energy.

UNIT IIISUSTAINABLE DEVELOPMENT AND GREEN TECHNOLOGIES (6 hours)

Concept of sustainable development and SDGs - Life cycle assessment (LCA) principles - Green building concepts and LEED certification - Cleaner production and industrial ecology - Environmental management systems (ISO 14001)

UNIT IV RENEWABLE ENERGY AND CLIMATE CHANGE (6 hours)

Solar energy systems: Photovoltaic and thermal applications - Wind energy: Technology and site assessment - Hydroelectric and geothermal energy systems - Climate change: Causes, effects, and mitigation strategies - Carbon footprint and carbon trading mechanisms

UNIT V ENVIRONMENTAL REGULATIONS AND CASE STUDIES (6 hours)

Environmental laws and regulations in India - Environmental clearance procedures - Corporate environmental responsibility - Case studies of environmental disasters and lessons learned - Future trends in environmental technology

TOTAL PERIODS: 30

TEXT BOOKS

1. G. Tyler Miller Jr., "Environmental Science: Working with the Earth", Cengage Learning, 2019
2. C. Anil Kumar, "Environmental Science and Engineering", PHI Learning, 2018 Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, 2017

REFERENCE BOOK & WEB RESOURCES

1. Richard T. Wright, "Environmental Science: Toward a Sustainable Future", Pearson, 2017
2. Daniel B. Botkin, "Environmental Science: Earth as a Living Planet", Wiley, 2018
3. Central Pollution Control Board - www.cpcb.nic.in
4. Ministry of Environment and Forests - www.moef.gov.in
5. UN Environment Programme - www.unep.org
6. NPTEL Environmental Science Courses - nptel.ac.in

Course Outcome

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

CO1	Understand fundamental principles of environmental science and ecosystem dynamics	Understand (K2)
CO2	Analyze various types of pollution and their impact on human health and the environment	Analyze (K4)
CO3	Apply principles of sustainable development in engineering design and decision-making	Apply (K3)
CO4	Evaluate renewable energy technologies and waste management systems	Evaluate (K5)
CO5	Design environmentally sustainable solutions for engineering problems	Apply (K3)

CO-PO/PSO MAPPING - ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

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

B.TECH. Information Technology (Autonomous R 2025)

CURRICULUM FROM THE ACADEMIC YEAR 2025-26

III SEMESTER

SEMESTER III -R-2025										
Sl. No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credit**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UMAT32	Probability and Statistics	BS	3	1	0	4	40	60	100
2.	25UITT31	Data Structures and Algorithms	PC	3	0	0	3	40	60	100
3.	25UITT32	Object Oriented Programming using Java	PC	3	0	0	3	40	60	100
4.	25UITT33	Microprocessors and Microcontrollers	ES	3	0	0	3	40	60	100
5.	25UITT34	Communication Engineering	ES	3	0	0	3	40	60	100
INTEGRATED COURSE										
6.	25UITI31	Fundamentals of Data Science	PC	3	0	2	4	50	50	100
PRACTICAL COURSES										
7.	25UITP31	Data Structures and Algorithms Lab	PC	0	0	2	1	60	40	100
8.	25UITP32	Object Oriented Programming using Java Lab	PC	0	0	2	1	60	40	100
9.	25UITP33	Microprocessors and Microcontrollers Lab	ES	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
10.	25UPCE31	Personality Development Skills	EEC	0	0	2	0	-	-	-
11.	25UCCCXX	Certification Course-II	CCC	0	0	0	0	-	-	-
MANDATORY COURSE										
12.	25UMCC31	Indian Constitution and Human Rights	MCC	2	0	0	0	-	-	-
Total							**23**	**430**	**470**	**900**

PROBABILITY AND STATISTICS			
Course Code:	**25UMAT32**	**Course Type:**	**BS**
Teaching Periods / Week (L:T:P):	**3:1:0**	**Credits:**	**4**
Total Teaching Periods:	**60**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**Mathematics**		

Course Objectives:

- To acquire knowledge in discrete random variable.
- To familiarize the student about the continuous random variables and their applications.
- To study the basic concepts of Statistics.
- To learn the application of Large Samples.
- To learn the concept of small sampling.

UNIT 1	**DISCRETE RANDOM VARIABLES**	**12**

Random Variables and their event spaces – The probability mass function – Distribution functions – Binomial – Geometric – Negative Binomial and Poisson (Excluding Derivation of Mean, variance and MGF)

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 2	**CONTINUOUS RANDOM VARIABLES**	**12**

Probability density function – Exponential distribution – Gamma – Uniform – Gaussian distributions (Excluding Derivation of Mean, variance and MGF)

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**STATISTICS**	**12**

Measures of central tendency – Arithmetic Mean, Median, Mode and Standard deviation – Correlation – Rank correlation and regression.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**CURVE FITTING AND LARGE SAMPLES**	**12**

Curve fitting by the method of least squares – fitting of straight lines – second degree parabolas and more general curves – Large Samples – Single Propositions – Difference of Proportions – Single Mean – Difference of mean – Difference of Standard Deviations.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**SMALL SAMPLES**	**12**

Test for mean – Test for ratio of variances – Chi-square test for goodness of fit and independence of

attributes. Analysis of variance – One way and two-way classifications.	
Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply
Total Periods	**60 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Quiz , Case Study ,Students' performance in continuous Assessment / Student Presentations, Model Exam

Course Outcomes:

CO1. Apply the concepts of probability and discrete distributions to solve real-world counting problems.

CO2. Solve engineering problems using continuous random variables and standard probability distributions.

CO3. Compute measures of central tendency, correlation, and regression coefficients to solve problems involving bivariate data.

CO4. Apply the concepts of curve fitting and large sample tests to validate statistical hypotheses and experimental data.

CO5. Use small sample hypothesis testing and ANOVA to determine the statistical significance of experimental results.

Textbooks:

T1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers – 44th Edition – 2023.

T2. T. Veerarajan, "Probability, Statistics and Random Processes", McGraw Hill Education – 3rd Edition (Reprint) – 2022.

T3. Dr. A. Singaravelu, "Probability and Statistics", Meenakshi Agency – Revised Edition – 2023.

T4. S.C. Gupta and V.K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand & Sons – 12th Revised Edition – 2020.

References:

R1. William Mendenhall, Robert J. Beaver, Barbara M. Beaver: "Introduction to Probability & Statistics", Cengage Learning; 15thEdition 2019.

R2. Richard. A. Johnson, Irwin Miller and John E. Freund," Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2018.

R3. A. Chandrasekaran Rao and G. Kavitha, "Probability, random process, Queueing Theory and Statistics", Dhanam Publications, 2012.

R4. Vijay K. Rohatgi and A.K. Md. Ehsanes Saleh, "An Introduction to Probability and Statistics", Wiley, 3rd Edition, 2015.

Web links and Video Lectures (e-Resources):

W1. http:// www.stat110.net

W2. http://www.nptel.ac.in/courses/111105035 (R.V)

W3. http:// www.probabilitycourse.com .

W4. www.edx.org/Probability

W5. http://www2.aueb.gr/users/demos/pro-stat.pdf

CO-PO & PSO-MAPPING -PROBABILITY AND STATISTICS

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

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

DATA STRUCTURES AND ALGORITHMS			
(Common to CSE &IT)			
Course Code:	**25UITT31**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To impart knowledge about the importance of data structures in programming and to familiarize basic searching and sorting algorithms.

UNIT 1	**BASIC TERMINOLOGIES OF DATA STRUCTURES**	**9**

Data structures: Definition, Types - Algorithm: Definition, Properties, Analyzing algorithms: Space and Time Complexity-Arrays: One-dimensional array, multidimensional array, Applications. Searching Algorithms: Linear search, Binary Search, Fibonacci search. Sorting Algorithms: Selection Sort, Bubble Sort, Quick Sort, Insertion Sort, Heap Sort and Merge Sort

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand, Apply

UNIT 2	**STACK, QUEUE AND LINKED LISTS**	**9**

Stacks: Definition – Operations - Applications of stack. Queues: Definition-Operations - Priority queues – De-queues – Applications of queue. Linked List: Singly Linked List, Doubly Linked List, Circular Linked List, Linked stacks, Linked queues, Applications of Linked List – Dynamic storage management.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**TREE**	**9**

Definition - Binary tree–Terminology – Representation – Operations -Applications – Binary search tree – AVL tree. B Trees: B Tree indexing - Operations on a B Tree - B + Tree Indexing. Trie - Trie operations.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**GRAPH**	**9**

Definition–Terminology–Representation-Traversals–Applications- Spanning tree, Shortest path and Transitive closure, Topological sort. Set: Definition - Representation - Operations on sets – Applications.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**HASH TABLE**	**9**

Tables: Rectangular tables-Jagged tables– Inverted tables-Symbol tables–Static tree tables -Dynamic tree tables-Hash tables-Overflow handling- Files: Sequential organization– Indexed organization

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand
Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain the fundamentals of algorithms, perform operations using arrays, and become familiar with basic searching and sorting algorithms.

CO2. Apply the linear data structures including Stack, Queue and Linked List along with their applications.

CO3. Use the properties of tree data structure and its importance in searching large database.

CO4. Apply the Non-Linear Graph Data Structures and its applications.

CO5. Demonstrate the concepts of Hashing, Files and their Organization

Textbooks:

T1. Ellis Horowitz, Sartaj Sahni," Fundamentals of Data Structures", Illustrated Edition, Computer Science Press, 2018.

T2. Thomas H.Coreman, Charles E.Leiserson, Ronald L.Rivestand Clifford Stein, "Introduction to Algorithms", PHI, Third Edition, 2010.

T3. Alfred V.Aho, Jeffrey D.Ullman, JohnE.Hopcroft, "Data Structures and Algorithms", 4th Edition, 2009.

T4. Michael T. Good richand Robert, Tamassia, Wiley "Data Structures and Algorithms in Python", by, 1st Edition.

References:

R1. D. Samanta, "Classic Data Structures", Prentice-Hall of India, Second Edition, 2012.

R2. John Canning, Alan Broder, Robert Lafore, "Data Structures & Algorithms in Python", Addison-Wesley Professional,1st Edition, 2022

Web links and Video Lectures (e-Resources):

W1. Programming, Data Structures and Algorithms Using Python: https://onlinecourses.nptel.ac. in/noc23 cs95

W2. Introduction to Programming, Data Structures and Algorithms Using Python: https://onlinecourses.nptel.ac.in/noc2 3 cs15

W3. Programming, Data Structures and Algorithms using Python for beginners: https://nptel.ac.in /courses/106106145

CO-PO & PSO-MAPPING - DATA STRUCTURES AND ALGORITHMS													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	1	1	2	-	-	-	-	-	1	1	1
CO2	3	2	1	1	2	-	-	-	-	-	1	1	1
CO3	3	2	1	1	2	-	-	-	-	-	1	1	1
CO4	3	2	1	1	2	-	-	-	-	-	1	1	1
CO5	3	2	1	1	2	-	-	-	-	-	1	1	1
AVG	3	2	1	1	2	-	-	-	-	-	1	1	1
1 – Low, 2 – Medium, 3 – High, '-' – No correlation													

OBJECT ORIENTED PROGRAMMING USING JAVA			
(Common to CSE &IT)			
Course Code:	**25UITT32**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- This course introduces learners to the foundational principles of Java programming and guides them through structured problem-solving using classes, objects, and reusable code.

UNIT 1	INTRODUCTION TO OOP AND JAVA	9

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors - Methods -Access specifiers - Static members - JavaDoc comments

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	INHERITANCE, PACKAGES AND INTERFACES	9

Overloading Methods – Objects as Parameters – Returning Objects – Static - Nested and Inner Classes - Inheritance - Basics – Types of Inheritance -Super keyword -Method Overriding – DynamicMethodDispatch–AbstractClasses–finalwithInheritance-PackagesandInterfaces -Packages–Packages and Member Access–Importing Packages–Interfaces.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	EXCEPTION HANDLING AND MULTITHREADING	9

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java Built-in Exceptions – User defined Exception - Multithreaded Programming - Java Thread Model – Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication - Suspending – Resuming and Stopping Threads – Multithreading. Wrappers – Auto boxing.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	I/O, GENERICS, STRINGHANDLING	9

I/OBasics–ReadingandWritingConsoleI/O–ReadingandWritingFiles-Generics-Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations - Strings - Basic String class, methods and String Buffer Class.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT

	RBT Level: Create	
UNIT 5	**JAVA FX EVENT HANDLING, CONTROLS AND COMPONENTS**	**9**
JAVAFX Events and Controls-Event Basics–Handling Key and Mouse Events -Controls, Checkbox, Toggle Button – Radio Buttons – List View – Combo Box – Choice Box – Text Controls–ScrollPane-Layouts–FlowPane–HBoxandVBox–BorderPane–StackPane– Grid Pane. Menus – Basics – Menu – Menu bars – Menu Item.		
Teaching Learning Process	Pedagogy: Chalk & Talk, PPT	
	RBT Level: Create	
	Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz, Case Study ,
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain the principles of Object-Oriented Programming (OOP) and its implementation using Java, including classes, methods, and access specifiers.

CO2. Apply the concepts of inheritance, polymorphism, and abstraction in developing Java programs.

CO3. Apply the error-handling mechanisms using exception handling and implement multithreading for concurrent programming.

CO4. Develop generic programs and handle strings effectively using Java's built-in libraries.

CO5. Design graphical user interfaces (GUIs) and event-driven applications using JavaFX controls, layouts, and menus.

Textbooks:

T1. Herbert Schildt, Java, "The Complete Reference", McGraw Hill Education, New Delhi, 12th Edition, 2021.

T2. Herbert Schildt, "Introducing JavaFX 8 Programming", McGraw Hill Education, New Delhi, 1st Edition, 2015.

References:

R1. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, Prentice Hall, 11th Edition, 2018.

R2. E Balagurusamy "Object Oriented Programming Using Java", McGraw Hill, 7th Edition, 2018.

Web links and Video Lectures (e-Resources):

W1. Object Oriented Programming: https://nptel.ac.in/courses/106105151
W2. Fundamentals of Object-Oriented Programming: https://nptel.ac.in/courses/106107574
W3. Programming in Java : https://nptel.ac.in/courses/106105191

CO-PO & PSO-MAPPING - OBJECT ORIENTED PROGRAMMING USING JAVA													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	1	1	-	-	1
CO2	3	2	-	2	-	-	-	-	1	1	-	2	1
CO3	2	2	-	2	-	-	-	-	-	-	-	2	1
CO4	3	2	1	2	1	-	-	-	1	1	1	2	1
CO5	3	2	1	2	1	-	-	-	-	-	1	2	1
AVG	2.8	1.8	0.4	1.6	0.4	-	-	-	0.6	0.6	0.4	1.6	1
1 – Low, 2 – Medium, 3 – High, '-' – No correlation													

MICROPROCESSORS AND MICROCONTROLLERS			
Course Code:	**25UITT33**	**Course Type:**	**ES**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**Electronics and Communication Engineering**		

Course Objectives:

- To learn the fundamentals of microprocessors and applications, interfacing the external devices to the processor according to the user requirements, enabling them to create novel products and solutions for real time problems.

UNIT 1	**INTEL 8085 MICROPROCESSOR**	**9**

Introduction - Need for Microprocessors, Evolution, Intel 8085 Hardware - Architecture, Pin description, Internal Registers, Arithmetic and Logic Unit, Control Unit, Instruction word size - Addressing modes, Instruction Set, Assembly Language Programming - Stacks and Subroutines, Timing Diagrams, Evolution of Microprocessors, 16-bit, 32-bit microprocessors and 64 bit microprocessor.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**INTEL 8085 INTERRUPTS AND DMA**	**9**

8085 Interrupts - Software and Hardware Interrupts - 8259 Programmable Interrupt Controller - Data Transfer Techniques - Synchronous - Asynchronous and Direct Memory Access (DMA) and 8237 DMA Controller- 8253 Programmable Interval Timer.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Understand

UNIT 3	**MEMORY & I/O INTERFACING**	**9**

Types of memory - Memory mapping and addressing , Concept of I/O map, types - I/O decode logic, Interfacing key switches and LEDs - 8279 Keyboard/Display Interface - 8255 Programmable Peripheral Interface - Concept of Serial Communication - 8251 UART/ USART - RS232C Interface.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**INTEL 8086 MICROPROCESSOR**	**9**

Introduction - Intel 8086 Hardware, Pin description, External memory Addressing, Bus cycles, Interrupt Processing - Addressing modes, Instruction set, Assembler Directives.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Analyze

UNIT 5	**MICROCONTROLLER**	**9**

Intel 8051 Microcontroller - Introduction Architecture, Memory Organization, Special Function Registers,

Pins and Signals, Timing and control, Port Operation - Memory and I/O interfacing, Interrupts - Instruction Set and Programming.	
Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply
Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz, Case Study ,
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain the working of 8085 microprocessor architecture, its evolution, need and its application,

CO2. Illustrate the interrupt structure, DMA operation, and programmable peripheral devices used with the 8085 microprocessor.

CO3. Design memory and I/O interfacing circuits using memory devices and programmable interface controllers.

CO4. Analyze the architecture, addressing modes, instruction set, and programming concepts of the Intel 8086 microprocessor.

CO5. Develop embedded applications using the Intel 8051 microcontroller through programming, memory organization, and interfacing techniques.

Textbooks:

T1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085", Penram Inter- national Publications, 6th Edition, 2020.

T2. Krishna Kant, "Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096", PHI, 2008.

References:

R1. A.P. Godse and D.A Godse, "Microprocessors and Microcontrollers", Technical Publications, 3rd Edition, 2023.

R2. Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386 and 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III Pentium 4 – Architecture, Programming and Interfacing", PHI, 8th Edition, 2019.

R3. N. Senthil Kumar, M Saravanan and S. Jeevananthan, "Microprocessors and Microcontrollers" , Oxford University Press, 2nd Edition, 2016.

R4. Ajay V Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw- Hill, 7th Edition, 2007.

Web links and Video Lectures (e-Resources):

W1. Microelectronics: Devices To Circuits: https://onlinecourses.nptel.ac.in/noc21ee86

W2. Microelectronics: Devices To Circuits: https://nptel.ac.in/courses/108107142

CO-PO & PSO-MAPPING - MICROPROCESSORS AND MICROCONTROLLERS													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	2	1	2	-	-	-	-	-	-	-	1
CO2	3	2	2	-	2	-	-	-	-	-	-	-	-
CO3	3	2	2	-	2	-	-	-	-	-	-	-	-
CO4	3	2	2	1	2	-	-	-	-	-	-	-	-
CO5	3	2	2	1	2	-	-	-	-	-	-	2	1
AVG	3	2	2	0.6	2	-	-	-	-	-	-	0.4	0.4
1 – Low, 2 – Medium, 3 – High, '-' – No correlation													

COMMUNICATION ENGINEERING			
Course Code:	**25UITT34**	**Course Type:**	**ES**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**Electronics and Communication Engineering**		

Course Objectives:

- To familiarize with the analog, pulse, and digital modulation systems and to learn the cellular mobile communication and satellite communication systems.

UNIT 1	**ANALOG COMMUNICATION**	**9**

Introduction to Communication Systems–Modulation–Types–Need for Modulation. Theory of Amplitude Modulation – Evolution and Description of DSBFC, DSBSC & SSBSC Techniques – Theory of Frequency and Phase Modulation –Super heterodyne AM – FM Transmitter and Receiver.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**PULSE MODULATION**	**9**

Principles of pulse modulation–sampling theorem, Generation and demodulation of PAM– PWM – PPM— Principles of Pulse Code Modulation- Theory of DPCM, DM, ADM and ADPCM.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Understand

UNIT 3	**DIGITAL MODULATION AND MULTIPLE ACCESS**	**9**

Principle of ASK - Transmitter and receiver for coherent BFSK, BPSK, QPSK - Basic principles of M-ary PSK and M-ary FSK-PN sequence–Spread spectrum techniques and its types (DSSS & FHSS), Multiple access techniques (TDMA, FDMA& CDMA).

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 4	**CELLULAR AND MOBILE COMMUNICATION STANDARDS**	**9**

Basic cellular concept - frequency reuse - Elements of cellular mobile radio - Handoff - Frequency management and channel assignment - concepts of cell splitting and cell sectoring – Principles of Global System for Mobile Communications (GSM) and its evolution (GPRS, EDGE, UMTS&LTE) - Principles of CDMA techniques.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**SATELLITE AND OPTICAL COMMUNICATION**	**9**

Introduction to Satellite Orbits and look angles - satellite link model and link budget calculations-satellites used for mobile networks and personal communication systems-GPS services- Need for fibre optics – fibre characteristics and classification, various fiber losses– LED, ILD and photo detectors - Power budget

analysis for an optical link.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand
Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Quiz , Case Study,
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain the fundamental aspects of analog modulation systems.
CO2. Describe various pulse modulation techniques used in communication systems.
CO3. Interpret various digital modulation techniques and the concepts of spread spectrum technologies.
CO4. Illustrate wireless standards, networking, GSM architecture, and mobile radio propagation in cellular communication systems.
CO5. Describe the basic components of satellite communication systems and the fundamental concepts of optical communication systems.

Textbooks:

T1. George Kennedy and Bernard Davis, "Electronic Communication Systems", Tata Mc Graw Hill, 6thEdition, 2017.
T2. S.Haykin,"Digital Communication", John Wiley2013.
T3. William C.Y.Lee, "Wireless and Cellular Telecommunications", McGrawHill, 3rdEdition, 2006.
T4. D.Roddy, "Satellite Communications", Tata McGraw Hill, 4th Edition, 2009.
Gerd Keiser, "Optical fibre Communications", McGraw Hill, 5th Edition, 2013.

References:

R1. Wayne Tomasi, "Electronics Communication systems", Pearson Education, 5th Edition, 2008.
R2. Simon Haykin and Wiley, "Communication Systems", 4th Edition, 2013.
R3. T.S.Rappaport, "Wireless Communication", Pearson education, 2nd Edition, 2010.

Web links and Video Lectures (e-Resources):

W1. Communication Engineering: https://nptel.ac.in/courses/117102059

CO-PO & PSO-MAPPING - COMMUNICATION ENGINEERING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	3	1	-	1	-	-	-	-	2	-	-	-
CO2	2	3	1	-	-	-	-	-	-	2	-	-	-
CO3	2	-	1	-	1	-	-	-	-	2	-	-	-
CO4	2	3	1	-	-	-	-	-	-	2	-	-	-
CO5	2	-	1	-	-	-	-	-	-	2	-	-	-
AVG	2	1.8	1	-	0.4	-	-	-	-	2	-	-	-

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

FUNDAMENTALS OF DATA SCIENCE			
(Common for CSE &IT)			
Course Code:	**25UITI31**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:2**	**Credits:**	**4**
Total Teaching Periods:	**60**	**CAM+ ESM Marks:**	**50+50=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To provide students with a comprehensive understanding of data science fundamentals and the data science process, enabling them to describe, analyze, and interpret data, identify relationships and patterns, perform data wrangling using Python libraries, and effectively present and visualize data using Python visualization tools.

UNIT 1	**INTRODUCTION**	**9**

Data Science: Benefits and uses – facets of data - Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation - Exploratory Data analysis – build the model–presenting findings and building applications-Data Mining-Data Warehousing– Basic Statistical descriptions of Data

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 2	**DESCRIBING DATA**	**9**

Types of Data -Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages - Describing Variability - Normal Distributions and Standard (z) Scores

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Analyze

UNIT 3	**DESCRIBING RELATIONSHIPS**	**9**

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line –Standard error of estimate–interpretation of r2–multiple regression equations–regression towards the mean.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Analyze

UNIT 4	**PYTHON LIBRARIES FOR DATA WRANGLING**	**9**

Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, Boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Analyze

UNIT 5	**DATA VISUALIZATION**	**9**

Importing Matplotlib – Line plots – Scatter plots –visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Basemap - Visualization with Seaborn.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Create

LIST OF EXPERIMENTS

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Stats models and Pandas packages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
    a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.
    b. Bivariate analysis: Linear and logistic regression modeling
    c. Multiple Regression analysis
    d. Also compare the results of the above analysis for the two data sets.
6. Apply and explore various plotting functions on UCI data sets.
    a. Normal curves
    b. Density and contour plots
    c. Correlation and scatter plots
    d. Histograms
    e. Three dimensional plotting
7. Visualizing Geographic Data with Basemap

Total Periods: 15 hrs

Total Periods	**Theory 45 + Practical 15 = 60 Hrs**

Suggested Activities and Evaluation Methods:

• Tutorials and Programming Assignments, Mini Projects , Quiz / MCQ (Programming Logic, GATE-related questions)

• Case Study, Lab Record and Viva-voce, Continuous Assessment Tests (CAT), Model Exam.

Course Outcomes:

CO1. Explain the fundamentals of Data Science, the data science lifecycle, data mining, data warehousing, and basic statistical concepts to solve real-world data-driven problems.

CO2. Analyze and summarize different types of data using descriptive statistics, tables, graphs, measures of central tendency, variability, and probability distributions.

CO3. Apply correlation and regression techniques to identify, analyze, and interpret relationships among variables for predictive modeling.

CO4. Utilize Python libraries such as NumPy and Pandas to perform data wrangling, preprocessing, indexing, aggregation, grouping, and transformation of datasets.

CO5. Develop meaningful visualizations using Matplotlib, Basemap, and Seaborn to effectively communicate data insights and support decision-making.

Textbooks:

T1. David Cielen,Arno D.B.Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (Unit I)

T2. Robert S.Witte and John S.Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017. (Units II and III)

T3. JakeVanderPlas, "Python Data Science Handbook", O'Reilly, 2016. (Units IV and V)

References:

R1. AurélienGéron, Hands-On Machine Learning with Scikit-Learn, Keras, and Tensor Flow, Wes McKinney, Python for Data Analysis, O'Reilly.

R2. AllenB.Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014. O'Reilly.

Web links and Video Lectures (e-Resources):

W1. Python for Data Science : https://nptel.ac.in/courses/106105186

W2. Python for Data Science: https://onlinecourses.nptel.ac.in/noc25/cs104/2388

CO-PO & PSO-MAPPING - FUNDAMENTALS OF DATA SCIENCE

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	2	1	–	1	-	1	–	1	2	2
CO2	2	3	1	2	2	–	–	–	1	–	1	2	2
CO3	2	3	2	3	2	–	–	–	1	–	1	2	3
CO4	2	2	2	2	3	–	–	1	1	1	1	3	3
CO5	2	2	2	2	3	–	1	1	1	3	1	3	3
AVG	2.2	2.4	1.6	2.2	2.2	0	0.4	0.4	1	0.8	1	2.4	2.6

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

DATA STRUCTURES AND ALGORITHMS LAB			
(Common for CSE &IT)			
Course Code:	**25UITP31**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**0:0:2**	**Credits:**	**1**
Total Teaching Periods:	**30**	**CAM + ESE Marks:**	**60+40=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

To enable students to write programs using various data structures, analyze and understand the benefits of choosing the right data structure.

Practical Exercises:	**Periods : 30 Hrs**

LIST OF EXPERIMENTS

1. Searching Algorithms (With the Number of Key Comparisons) - Sequential, Binary and Fibonacci Search Algorithms on an Ordered List
2. Sorting Algorithms: Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Heap Sort and Merge Sort.
3. Implementation of Stack and Its Operations.
4. Application of Stack for Converting an Arithmetic Expression into Postfix Form and Evaluation of Postfix Expression.
5. Implementation of Queue, Circular Queue, Priority Queue, Dequeue and Their Operations.
6. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List.
7. Implementation of Binary Tree and Binary Traversal Techniques.
8. Implementation of Graph Traversal Techniques.
9. Implement Dijkstra's Algorithm to Obtain the Shortest Paths.
10. Implementation of Hash Tables and its Operations.

Course Outcomes:

After Successful completion of this course, the student should be able to

CO1. Implement the searching and sorting algorithms using C programs.

CO2. Implement the linear data structures stacks, queues, and linked list operations in C.

CO3. Implement the binary tree searching programs.

CO4. Solve the traversal and shortest path problems by implementing graph data structures.

CO5. Implement the programs using hash tables.

CO-PO & PSO- MAPPING : DATA STRUCTURES AND ALGORITHMS LAB

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

1–Low, 2–Medium, 3–High, '-' –No correlation

OBJECT ORIENTED PROGRAMMING USING JAVA LAB			
(Common for CSE &IT)			
Course Code:	**25UITP32**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**0:0:2**	**Credits:**	**1**
Total Teaching Periods:	**30**	**CAM + ESM Marks:**	**60+40=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To understand and implement the concepts of classes, packages, interfaces, inheritance, exception handling, event handling, file processing, and develop applications using generic programming.
- To provide software development skills using Java programming for real-world applications.

Practical Exercises:	**Periods : 30 Hrs**

LIST OF EXPERIMENTS

1. Develop a Java application with an Employee class having Empname, EmpID, Address, MailId, and Mobile No as members. Inherit the classes Programmer, Assistant Professor, Associate Professor, and Professor from the Employee class. Add Basic Pay (BP) as a member of all the inherited classes with 97% of BP as DA, 10% of BP as HRA, 12% of BP as PF, and 0.1% of BP for staff club funds. Generate pay slips for the employees with their gross and net salary.

2. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape.

3. Solve the above problem using an interface.

4. Implement exception handling and creation of user-defined exceptions.

5. Write a Java program that implements a multi-threaded application that has three threads. The first thread generates a random integer every 1 second, and if the value is even, the second thread computes the square of the number and prints it. If the value is odd, the third thread prints the cube of the number.

6. Write a program to perform file operations.

7. Develop applications to demonstrate the features of generic classes.

8. Develop applications using JavaFX controls, layouts, and menus.

9. Develop a mini project for any application using Java concepts.

Course Outcomes:

After Successful completion of this course, the student should be able to

CO1. Implement Java programs using Object Oriented concepts.

CO2. Implement the role of Packages, Interfaces, Inheritance, and Exception Handling in simple applications.

CO3. Demonstrate the multithreading and generics concepts in Java.

CO4. Develop GUI and event-driven programming applications using JavaFX.

CO5. Develop web applications using Java.

CO-PO & PSO- MAPPING : OBJECT ORIENTED PROGRAMMING USING JAVA LAB

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	1	-	1	1	1
CO2	3	2	-	-	2	-	-	-	1	-	1	1	1
CO3	3	2	-	-	2	-	-	-	1	-	2	1	1
CO4	3	2	2	2	3	-	-	-	1	-	2	1	1
CO5	3	2	2	2	3	-	-	-	1	-	2	1	1
AVG	3	2	0.8	0.8	2.4	-	-	-	1	-	1.6	1	1

1–Low, 2–Medium, 3–High, '-' –No correlation

MICROPROCESSORS AND MICROCONTROLLERS LAB			
Course Code:	**25UITP33**	**Course Type:**	**ES**
Teaching Periods / Week (L:T:P):	**0:0:2**	**Credits:**	**1**
Total Teaching Periods:	**30**	**CAM + ESE Marks:**	**60+40=100**
Teaching Department:	**Electronics and Communication Engineering**		

Course Objectives:

- To enrich assembly language programming knowledge using 8085, 8086, and 8051 microprocessor and microcontroller.

Practical Exercises:	**Periods : 30 Hrs**

LIST OF EXPERIMENTS (SYLLABUS)

Experiment using 8085 Microprocessor:

1. Study of 8085 Microprocessor Trainer Kit
2. 8-bit Arithmetic Operations (Addition, Subtraction, Multiplication, and Division)
3. Block Operations (Move, Exchange, Compare, Insert, and Delete)
4. Code Conversions
5. Digital Clock Simulation
6. Moving Display
7. Serial Communication
8. Interrupt Programming
9. Elevator Simulation
10. Traffic Light Control

Experiments using 8086 Microprocessor with MASM:

11. Arithmetic Operations
12. Sorting and Searching

Experiments using 8051 Microcontroller

13. Arithmetic operations
14. ADC & DAC Interfacing
15. Stepper Motor and DC Motor Interface

TOTAL PERIODS:30

Course Outcomes:

After Successful completion of this course, the student should be able to

CO1. Explain the inner working components of microprocessors and microcontrollers.

CO2. Implement assembly language programs using the 8085-instruction set.

CO3. Implement assembly language programs using the 8086-instruction set.

CO4. Implement assembly language programs using the 8051-instruction set.

CO5. Implement various I/O programs for 8085, 8086, and 8051.

CO-PO & PSO MAPPING : MICROPROCESSORS AND MICROCONTROLLERS LAB

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	-	-	-	-	-	-	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	1	-	-
CO4	3	2	1	1	-	-	-	-	-	-	1	-	-
CO5	3	2	1	1	-	-	-	-	-	-	1	-	-
AVG	3	2	1	1	-	-	-	-	-	-	0.6	-	-

1–Low, 2–Medium, 3–High, '-' –No correlation

PERSONALITY DEVELOPMENT SKILLS			
Common to all Branches			
Course Code:	**25UPCE31**	**Course Type:**	**EEC**
L : T : P:	**0:0:2**	**Credits:**	**0 (Zero Credit)**
Total Periods:	**30 Hours**	**Evaluation:**	**Internal Assessment**
Teaching Department:	**Placement and Training Cell**		
Prerequisite:	Basic proficiency in English communication, fundamental understanding of self-awareness and personal behavior.		

Course Objectives:

1. To develop a well-rounded personality by enhancing essential personal and professional skills.
2. To foster self-awareness, effective communication, and interpersonal abilities.
3. To build emotional intelligence, confidence, and leadership qualities.
4. To prepare students for interviews with resume building and behavioral skills.
5. To develop goal-setting strategies and professional workplace etiquette.

UNIT 1	WORKPLACE ETIQUETTE AND MS OFFICE	10

Workplace and Email Etiquette: Professional Behavior and Dress Code – Email and Meeting Etiquette

Microsoft office suite: MS Word(Document Creation and Formatting) - MS Excel (Data Analysis and Functions) - MS PowerPoint (Creating Effective Presentations)

UNIT 2	BUSINESS COMMUNICATION AND SALES	10

Business Communication: Verbal and Non - Verbal Communication – Written Communication in Business.

Sales and Negotiations : Sales Techniques and Strategies – Negotiation Tactics and Styles.

Customer Service: Effective Communication Skills- Customer support channels and Tools

UNIT 3	DECISION MAKING AND PROBLEM SOLVING	10

Decision Making: Types of Decision Making – Decision Making models and Techniques – Cognitive Biases and Risk Assessment

Problem Solving: Problem Identification and Analysis – Creative and Critical Thinking techniques – Implementation and Evaluation techniques

UNIT 4	INTERVIEW SKILLS AND BEHAVIORAL COMPETENCIES	10

Interview Skills: Preparation and Research – Effective Communication and Presentation

Resume Building: Resume Formats and Structure – Tailoring Resumes for Specific Jobs

Mannerism: Body Language – Respect and Courtesy in Interactions

Behavioral skills: Emotional Intelligence – Adaptability and flexibility.

UNIT 5	GROUP DISCUSSION AND MOCK INTERVIEWS	8

Group Discussion: Effective communication and Active Listening – Leadership and Participation skills – Critical Thinking and Topic Analysis

Monk Interview: Common Interview Questions and Ideal Responses – Feedback and Self Assessment

Total Periods : 30

Course Outcomes:

After successful completion of this course, the student should be able to:

CO1: Apply workplace etiquette and use Microsoft Office tools effectively for professional communication and documentation.

CO2: Demonstrate effective communication skills in business contexts, including sales, negotiation, and customer service scenarios.

CO3: Apply structured decision-making and problem-solving techniques in professional and organizational settings.

CO4: Prepare for interviews and present oneself professionally with an effective resume, proper mannerisms, and behavioral skills.

CO5: Demonstrate confidence and clarity in group discussions and interviews through guided practice and feedback.

Textbooks:

T1. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education.

T2. Seven Habits of Highly Effective People by STEPHEN COVEY.

References:

R1. Communication Skills by SANJAY KUMAR, PUSHP , Oxford Higher Education

R2. Communication Skills for Professionals by NIRAKONAR, PHI learning Pvt. Ltd.

WEB RESOURCES

W1. Microsoft Support, "Microsoft Office Training Center." [Online]. Available: https://support.microsoft.com/training. [Accessed: Jan. 28, 2026].

W2. Harvard Business Review, "Communication and Career Development Articles." [Online]. Available: https://hbr.org. [Accessed: Jan. 28, 2026].

W3. NPTEL, "Soft Skills and Professional Communication," IIT Courses. [Online]. Available: https://nptel.ac.in. [Accessed: Jan. 28, 2026].

W4. LinkedIn Learning, "Business Communication and Interview Preparation Courses." [Online]. Available: https://www.linkedin.com/learning. [Accessed: Jan. 28, 2026].

CO-PO & PSO- Mapping-PERSONALITY DEVELOPMENT SKILLS

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	2	-	-	-	2	2	-	-	-
CO2	-	-	-	-	-	-	-	2	2	2	-	-	-
CO3	2	-	-	2	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	2	2	2	-	-
CO5	-	-	-	-	-	-	-	-	2	2	2	-	-
AVG	0.4	-	-	0.4	0.4	-	-	0.4	1.6	1.6	1.2	-	-

INDIAN CONSTITUTION AND HUMAN RIGHTS			
(Common to All Branches of UG Engineering Programs)			
Course Code:	**25UMCC31**	**Course Type:**	**Mandatory Course (Audit)**
Teaching Periods / Week (L:T:P):	**2:0:0**	**Credits:**	**0 (Zero)**
Total Teaching Periods:	**30**	**Evaluation:**	**Internal Assessment**
Teaching Department:	**General Engineering**		

Course Objectives:

To impart knowledge on:

1. Historical background, Preamble, and salient features of the Indian Constitution
2. Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties
3. Structure and functioning of Union, State, and Local Self Governments
4. Universal Human Rights principles and international protection frameworks
5. Contemporary human rights issues and remedial mechanisms in India

UNIT 1	INTRODUCTION TO INDIAN CONSTITUTION	6

Historical Background: Making of the Constitution - Constituent Assembly and its key members - Draft Committee. Preamble: Philosophy and Core Values - Sovereign, Socialist, Secular, Democratic, Republic - Justice, Liberty, Equality, Fraternity. Salient Features of Indian Constitution: Written Constitution - Lengthy document - Blend of Rigidity and Flexibility - Federal Structure with Unitary Bias - Parliamentary System.

Instructional Activity

Timeline Activity on Constitutional History (or) Preamble Analysis Worksheet

Teaching Learning Process	Pedagogy: Interactive Lecture, Think-Pair-Share, Video-based Learning (Documentary on Constituent Assembly), Group Discussion
	RBT Level: Theory: K1, K2

UNIT 2	FUNDAMENTAL RIGHTS AND DUTIES	6

Fundamental Rights (Articles 12-35): Right to Equality (Art. 14-18) - Right to Freedom (Art. 19-22) - Right Against Exploitation (Art. 23-24) - Right to Freedom of Religion (Art. 25-28) - Cultural and Educational Rights (Art. 29-30) - Right to Constitutional Remedies (Art. 32): Writs - Habeas Corpus,

Mandamus, Prohibition, Certiorari, Quo Warranto. Directive Principles of State Policy (Articles 36-51): Classification - Socialistic, Gandhian, Liberal-Intellectual Principles. Fundamental Duties (Article 51A): Citizen Responsibilities - 11 Duties. Relationship and Conflict between Fundamental Rights and Directive Principles.		
Instructional Activity		
Case Study Analysis on Landmark Supreme Court Judgments (or) Mock PIL Filing Exercise (or) Rights Violation Scenario Analysis		
Teaching Learning Process	Pedagogy: Case Study Method, Role Play (Mock Court), Jigsaw Activity, Debate Session (FR vs DPSP), Scenario-based Learning, Problem-Based Learning	
	RBT Level: Theory: K1, K2	
UNIT 3	**UNION AND STATE GOVERNMENT STRUCTURE**	**6**
Union Executive: President - Election, Powers, Position - Vice-President - Prime Minister and Council of Ministers - Cabinet Committees. Union Legislature: Parliament - Lok Sabha and Rajya Sabha - Composition, Functions - Legislative Process - Bill to Act. State Executive: Governor - Chief Minister - State Council of Ministers. State Legislature: Legislative Assembly and Council - State Law-making Process. Centre-State Relations: Legislative, Administrative, and Financial Relations - Role of Finance Commission. Local Self Government: 73rd Amendment (Panchayati Raj) - 74th Amendment (Urban Local Bodies) - Three-tier System.		
Instructional Activity		
Flowchart Creation (Bill to Law) (or) Field Visit Report on Local Panchayat/Municipality		
Teaching Learning Process	Pedagogy: Simulation Exercise, Collaborative Learning, Comparative Analysis (Venn Diagrams), Field Visit/Virtual Tour, Guest Lecture by Government Official	
	RBT Level: Theory: K1, K2	
UNIT 4	**HUMAN RIGHTS: CONCEPTS AND FRAMEWORKS**	**6**
Evolution of Human Rights: Historical Development - Natural Rights Theory - Magna Carta - French Declaration - American Bill of Rights. Universal Declaration of Human Rights (UDHR) 1948: 30		

Articles - Civil, Political, Economic, Social, Cultural Rights. International Human Rights Instruments: ICCPR - ICESCR - CEDAW - CRC - CAT - CERD. Human Rights in Indian Constitution: Part III and Part IV Provisions. National Human Rights Commission (NHRC): Composition - Functions - Powers - Procedure. State Human Rights Commissions - National Commission for Women, SC, ST, Minorities.		
Instructional activities		
NHRC Case Study Analysis		
Teaching Learning Process	Pedagogy: Video Case Study, Seminar Presentation	
	RBT Level: Theory: : K1, K2 , K3	
UNIT 5	**CONTEMPORARY HUMAN RIGHTS ISSUES**	**6**
Rights of Vulnerable Groups: Women (POSH Act, Domestic Violence Act) - Children (POCSO, JJ Act) - Elderly (Maintenance Act) - Persons with Disabilities (RPWD Act 2016). Rights of Marginalized Communities: SC/ST (Prevention of Atrocities Act) - Minorities - LGBTQ+ (Navtej Singh Johar Case). Right to Information (RTI Act 2005): Provisions and Application. Right to Education (RTE Act 2009). Environmental Rights: Right to Clean Environment - Sustainable Development - PIL on Environmental Issues. Digital Rights: Right to Privacy (Puttaswamy Case) - Data Protection - Cyber Rights. Human Rights Violations and Remedies: Legal Aid - Grievance Redressal Mechanisms.		
Instructional activities		
RTI Application Drafting Workshop (or) Case Study on HR Violations		
Teaching Learning Process	Pedagogy: Problem-Based Learning, Panel Discussion, RTI Workshop	
	RBT Level: Theory: K1, K2 , K3	
Total Periods: 30		
Suggested Activities and Evaluation Methods:		
Active Learning: Case Studies, Role Play, Mock Court/Parliament, Group Discussions, Debates, Panel Discussions Practical Activities: RTI Application Drafting, Field Visits to Panchayat/Municipal Offices,		

Digital Tools: Kahoot Quizzes, Mentimeter Polls, Online Discussion Forums, Digital Portfolios

Assessment Methods: Entry/Exit Tickets, One-Minute Papers, Peer Review, Reflective Journals, Group Presentations

Evaluation: CAT, Model Exam, Continuous Assessment through Formative Activities, End-Semester Viva-voce/Written Test

Course Outcomes:

After successful completion of this course, the student should be able to:

CO1 Understand the historical background of the Indian Constitution, the role of the Constituent Assembly and Drafting Committee, the philosophy and core values of the Preamble, and the salient features of the Indian Constitution.

CO2 Describe the Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties, including constitutional remedies and writs, and explain their relationship through judicial interpretations.

CO3 Understand the structure, powers, and functions of the Union, State, and Local Self Governments, including legislative processes and Centre–State relations under the Indian Constitution.

CO4 Apply the concepts and principles of human rights to identify international human rights frameworks and analyze the role of constitutional and statutory bodies in human rights protection in India.

CO5 Apply constitutional provisions, laws, and remedial mechanisms to analyze contemporary human rights issues, including those related to vulnerable groups, digital rights, environmental rights, and grievance redressal systems.

Textbooks:

T1: D.D. Basu, "Introduction to the Constitution of India", 24th Edition, LexisNexis, 2020.

T3: S.K. Kapoor, "Human Rights Under International Law and Indian Law", Central Law Agency, 2018.

References:

R1: Granville Austin, "The Indian Constitution: Cornerstone of a Nation", Oxford University Press, 2019.

R2: J.N. Pandey, "Constitutional Law of India", 57th Edition, Central Law Agency, 2020.

R3: P.M. Bakshi, "The Constitution of India", Universal Law Publishing, 2020.

Web Links and Video Lectures (e-Resources):

1. Constitution of India - https://legislative.gov.in/constitution-of-india
2. National Human Rights Commission - https://nhrc.nic.in
3. SWAYAM Course on Indian Constitution - https://swayam.gov.in
4. NPTEL Course on Constitution of India - https://nptel.ac.in

CO-PO & PSO Mapping - INDIAN CONSTITUTION AND HUMAN RIGHTS

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	2	2	-	-	-	1	-	-
CO2	-	-	-	-	-	3	3	1	1	-	2	-	-
CO3	-	-	-	-	-	2	2	1	-	-	1	-	-
CO4	-	-	-	-	-	3	2	-	2	-	2	-	-
CO5	-	-	-	-	-	3	3	2	2	-	2	-	-
AVG	-	-	-	-	-	**2.6**	**2.4**	**0.8**	**1**	**-**	**1.6**	**-**	**-**

1 - Low, 2 - Medium, 3 – High , '-' –No correlation

***Note - [Bloom's Taxonomy: K1- Remember, K2- Understand, K3-Apply, and K4-Analysis]**

B.TECH. Information Technology (Autonomous R 2025)

CURRICULUM FROM THE ACADEMIC YEAR 2025-26

HONORS DEGREE

B.Tech. IT. (Honors) in Information Technology

(Data Science)

HONOR COURSES									
SEM	**Course Code**	**Course Title**	**Periods**				**MARKS**		
			L	**T**	**P**	**Credits**	**CAM**	**ESM**	**TM**
Theory Courses									
III	25UITH01	Exploratory Data Analysis	3	1	0	4	40	60	100
IV	25UITH02	Business Analytics	3	1	0	4	40	60	100
V	25UITH03	Computer Vision	3	1	0	4	40	60	100
VI	25UITH04	Natural Language Processing	3	1	0	4	40	60	100
VII	25UITH05	Neural Networks and Deep Learning	3	1	0	4	40	60	100
						20			

EXPLORATORY DATA ANALYSIS			
Course Code:	**25UITH01**	**Course Type:**	**Honor**
Teaching Periods / Week (L:T:P):	**3:1:0**	**Credits:**	**4**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To understand the concept of exploratory data analysis. To apply univariate & bivariate data exploration and analysis.

UNIT 1	**EXPLORATORY DATA ANALYSIS**	**9**

EDA fundamentals - Understanding data science - Significance of EDA - Making sense of data - Comparing EDA with classical and Bayesian analysis - Software tools for EDA - Visual Aids for EDA - Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**EDA USING PYTHON**	**9**

Data Manipulation using Pandas- Pandas Objects- Data Indexing and Selection - Operating on Data - Handling Missing Data - Hierarchical Indexing - Combining datasets - Concat, Append, Merge and Join - Aggregation and grouping - Pivot Tables - Vectorized String Operations.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**UNIVARIATE ANALYSIS**	**9**

Introduction to Single variable: Distribution Variables- Numerical Summaries of Level and Spread - Scaling and Standardizing - Inequality.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**BIVARIATE ANALYSIS**	**9**

Relationships between Two Variables - Percentage Tables - Analysing Contingency Tables - Handling Several Batches - Scatterplots and Resistant Lines.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**MULTIVARIATE AND TIME SERIES ANALYSIS**	**9**

Introducing a Third Variable - Causal Explanations – Three Variable Contingency Tables and Beyond - Fundamentals of TSA - Characteristics of time series data - Data Cleaning - Time-based indexing - Visualizing - Grouping - Resampling.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT

	RBT Level: Apply
Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO6. Explain the fundamentals and significance of Exploratory Data Analysis (EDA).

CO7. Apply Python and Pandas for data manipulation and analysis.

CO8. Apply univariate analysis techniques for single-variable datasets.

CO9. Apply bivariate analysis techniques to study relationships between variables.

CO10. Apply multivariate and time series analysis techniques for complex datasets.

Textbooks:

T5. Suresh Kumar Mukhiya and Usman Ahmed, "Hands-On Exploratory Data Analysis with Python", Packt Publishing, 2020.

T6. Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data", O Reilly, 1st Edition, 2017.

T7. Catherine Marsh and Jane Elliott, "Exploring Data: An Introduction to Data Analysis for Social Scientists", Wiley Publications, 2 nd Edition, 2008.

References:

R3. Eric Pimpler, "Data Visualization and Exploration with R", GeoSpatial Training service, 2017.

R4. Claus O. Wilke, "Fundamentals of Data Visualization", O'reilly publications, 2019.

R5. Matthew O. Ward, Georges Grinstein, and Daniel Keim, "Interactive Data Visualization: Foundations, Techniques, and Applications", CRC press, 2nd Edition, 2015.

Web links and Video Lectures (e-Resources):

CO-PO & PSO-MAPPING - EXPLORATORY DATA ANALYSIS

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	2	-	-	-	-	-	1	2	1
CO2	2	3	2	2	3	-	-	-	-	-	1	3	2
CO3	2	3	1	2	2	-	-	-	-	-	1	2	1
CO4	2	3	2	2	3	-	-	-	1	-	1	2	2
CO5	2	3	2	3	3	1	-	-	1	-	2	3	3
AVG	2.2	2.8	1.6	2.0	2.6	0.2	-	-	0.4	-	1.2	2.4	1.8

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

LIST OF EXPERIMENTS

1. Install the data Analysis and Visualization tool: R/ Python /Tableau Public/ Power BI.
2. Working with Pandas data frames.
3. To build basic plots using Matplotlib.
4. Perform Time Series Analysis and apply the various visualization techniques.
5. Perform Data Analysis and representation on a Map using various Map data sets with Mouse Rollover effect, user interaction, etc.
6. Build cartographic visualization for multiple datasets involving various countries of the world; states and districts in India etc.
7. Perform EDA on open source Data Set.
8. Use a case study on a data set and apply the various EDA and visualization techniques and present an analysis report.

B.TECH. Information Technology (Autonomous R 2025)

CURRICULUM FROM THE ACADEMIC YEAR 2025-26

B.Tech. IT -Minor Courses offered to other Departments (MECH, ECE, EEE, RA,FT)

Minor in Full Stack Web Development

MINOR COURSES									
SEM	Course Code	Course Title	Periods				MARKS		
			L	T	P	Credits	CAM	ESM	TM
Theory									
III	25UITM01	Web Programming I	3	1	0	4	40	60	100
IV	25UITM02	Web Programming II	3	1	0	4	40	60	100
V	25UITM03	Fundamentals of Cloud Computing	3	1	0	4	40	60	100
VI	25UITM04	Fundamentals of UI and UX Design	3	1	0	4	40	60	100
VII	25UITM05	Fundamentals of Full Stack Web Development	3	1	0	4	40	60	100
						20			

WEB PROGRAMMING I			
Course Code:	**25UITM01**	**Course Type:**	**Minor**
Teaching Periods / Week (L:T:P):	**3:1:0**	**Credits:**	**4**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To familiarize the basic concepts of web programming, web designing, client side, server side processing and scripting. To learn the creation of web sites and database applications.

UNIT 1	**WEB ESSENTIALS**	**9**

Internet Overview - Fundamental Computer Network Concepts - Web Protocols - URL - Domain Name - Web Browsers and Web Servers - Working Principle of a Website - Creating a Website - Client-side and Server-side Scripting

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**WEB DESIGNING**	**9**

HTML5 : Introduction to HTML5 - Structure of HTML Document - Text Formatting Tags - Hyperlinks - Lists - Tables - Semantic Elements - Forms and Form Controls - Input Types - Media Elements

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**CSS3**	**9**

Introduction to CSS3 - Types of Style Sheets - Selectors - Box Model - Backgrounds and Borders - Text Effects - Positioning and Layout - Animations - Multiple Column Layout - User Interface

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**CLIENT-SIDE SCRIPTING**	**9**

JavaScript Introduction - Variables and Data Types - Statements - Operators - Literals - Functions - Arrays - Objects - Built-in Objects - Event Handling

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**ADVANCED JAVASCRIPT**	**9**

Regular Expressions - Exception Handling - Form Validation - DOM Basics - Dynamic Content Manipulation - JavaScript Debuggers - Interactive Web Page Development.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT

	RBT Level: Apply
Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain the fundamentals of Internet technologies, web architecture, web protocols, and website working principles.

CO2. Design structured web pages using HTML5 elements, forms, media components, and semantic tags.

CO3. Apply CSS3 features to develop visually appealing and responsive web page layouts.

CO4. Apply JavaScript programming concepts to develop client-side scripts using variables, functions, arrays, objects, and event handling.

CO5. Apply JavaScript techniques for form validation, DOM manipulation, regular expressions, exception handling, and interactive web page development.

Textbooks:

T1. Internet and World Wide Web: How to Program, Pearson Education, 5th Edition.
T2. Learning PHP, MySQL & JavaScript, O'Reilly Media, 7th Edition, 2025.
T3. Web Technologies: A Computer Science Perspective, Pearson Education, Latest Reprint Edition, 2021.

References:

R1. Computer Networking: A Top-Down Approach, Pearson Education, 8th Edition, 2021.
R2. JavaScript: The Complete Reference, McGraw Hill Education, 4th Edition, 2023.
R3. HTML and CSS: Design and Build Websites, Wiley India, Reprint Edition.

Web links and Video Lectures (e-Resources):

SWAYAM – Web Based Technologies and Multimedia Applications

CO-PO & PSO-MAPPING - WEB PROGRAMMING -I

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	1	1	2	-
CO2	3	2	2	-	2	-	-	-	1	1	1	2	-
CO3	3	2	3	-	2	-	-	-	1	1	1	2	-
CO4	3	3	3	1	2	-	-	-	1	1	1	2	1
CO5	3	3	3	2	3	-	-	-	1	1	1	3	1
AVG	3.0	2.4	2.2	0.6	2.2	-	-	-	0.8	1.0	1.0	2.2	0.4

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

Practice exercise:

1. Design a personal portfolio webpage containing profile details, educational qualification, skills, achievements, images, hyperlinks, lists, and contact information.
2. Create a college website homepage using semantic elements such as `<header>`, `<nav>`, `<section>`, `<article>`, and `<footer>`.
3. Create a student registration form with text fields, password fields, radio buttons, checkboxes, dropdown lists, date picker, email, and file upload controls.
4. Design a class timetable webpage using table elements with row span, column span, table captions, and styling.
5. Develop a webpage that embeds audio, video, YouTube links, and images using HTML5 multimedia tags.
6. Create a responsive webpage applying CSS3 properties such as selectors, box model, borders, padding, margins, backgrounds, gradients, and media queries.
7. Design an animated navigation bar with hover effects, transitions, transformations, and keyframe animations.
8. Develop a JavaScript application to calculate total marks, average, grade, and result status using variables, operators, conditional statements, and functions.
9. Create a webpage that performs operations such as changing background color, displaying alerts, image swapping, and dynamic text updates using mouse and keyboard events.
10. Develop a student login or registration form with validation for username, password, email, mobile number, and required fields using DOM methods and regular expressions.

B.TECH. Information Technology (Autonomous R 2025)

CURRICULUM FROM THE ACADEMIC YEAR 2025-26

IV SEMESTER

SEMESTER IV -R-2025										
Sl. No	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**Credit**	**MARKS**		
								CAM	**ESM**	**TM**
THEORY COURSES										
1.	25UMAT43	Discrete Mathematics	BS	3	1	0	4	40	60	100
2.	25UITT41	Operating Systems	PC	3	0	0	3	40	60	100
3.	25UITT42	Database Management Systems	PC	3	0	0	3	40	60	100
4.	25UITT43	Software Engineering	PC	3	0	0	3	40	60	100
5.	25UITT44	Information Coding Techniques	PC	3	0	0	3	40	60	100
INTEGRATED COURSE										
6.	25UITI41	Design and Analysis of Algorithms	PC	3	0	2	4	50	50	100
PRACTICAL COURSES										
7.	25UITP41	Operating Systems Lab	PC	0	0	2	1	60	40	100
8.	25UITP42	Database Management Systems Lab	PC	0	0	2	1	60	40	100
CORE ENRICHMENT COURSE										
9.	25UITW41	Mini Project – I	CEC	0	0	2	1	60	40	100
EMPLOYABILITY ENHANCEMENT COURSES										
10.	25UPCE41	Professionalism and Basic Aptitude	EEC	0	0	2	0	-	-	-
11.	25UCCCXX	Certification Course-III	CCC	0	0	0	0	-	-	-
MANDATORY COURSE										
12.	25UMCC41	Entrepreneurial skills and concepts	MCC	2	0	0	0	-	-	-
Total							**23**	**430**	**470**	**900**

DISCRETE MATHEMATICS			
Course Code:	**25UMAT43**	**Course Type:**	**BS**
Teaching Periods / Week (L:T:P):	**3:1:0**	**Credits:**	**4**
Total Teaching Periods:	**60**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**Mathematics**		

Course Objectives:

- To introduce the fundamental concepts of propositional and predicate logic for mathematical reasoning and proof techniques.
- To develop skills in combinatorial analysis and problem-solving using counting principles, permutations, combinations and recurrence relations.
- To provide knowledge of graph theory concepts and their applications in modelling and solving real-world problems.
- To examine algebraic structures including groups, rings, and fields, and their fundamental properties.
- To familiarize students with lattice theory and Boolean algebra for applications in computer science and digital logic design.

UNIT 1	**LOGIC AND PROOFS**	**12**
Propositional Logic–Propositional Equivalences–Normal Forms–Predicates and Quantifiers– Nested Quantifiers–Rules of Inference–Introduction to Proofs–Proof Methods and Strategy.		
Teaching Learning Process	Pedagogy: Chalk & Talk, PPT	
	RBT Level: Apply	

UNIT 2	**COMBINATORICS**	**12**
Mathematical Induction –Strong Induction and Well Ordering–The Basics of Counting–The Pigeonhole Principle–Permutations and Combinations–Recurrence Relations–Solving Linear Recurrence Relations Using Generating Functions –Inclusion-Exclusion Principle and its Applications.		
Teaching Learning Process	Pedagogy :Chalk & Talk, PPT	
	RBT Level: Apply	

UNIT 3	**GRAPHS**	**12**
Graphs and Graph Models –Graph Terminology and Special types of Graphs –Matrix Representation of Graphs and Graph Isomorphism –Connectivity–Euler and Hamiltonian Paths.		
Teaching Learning Process	Pedagogy: Chalk & Talk, PPT	
	RBT Level: Apply	

UNIT 4	**ALGEBRAIC STRUCTURES**	**12**
Groups–Subgroups – Homomorphisms – Normal Subgroups and Cosets – Lagrange's Theorem – Rings and Fields (Definitions and Examples only)		
Teaching Learning Process	Pedagogy: Chalk & Talk, PPT	
	RBT Level: Apply	

UNIT 5	**LATTICES AND BOOLEAN ALGEBRA**	**12**
Partial Ordering – Posets – Lattices as Posets– Properties of Lattices –Lattices as Algebraic Systems– Sub lattices –Direct Product and Homomorphism – Some Special Lattices– Boolean Algebra.		

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply
Total Periods	**60 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Quiz , Case Study ,Students' performance in continuous Assessment / Student Presentations, Model Exam.

Course Outcomes:

CO1. Apply propositional and predicate logic to construct valid arguments and develop mathematical proofs using various proof techniques.

CO2. Solve counting problems using mathematical induction, pigeonhole principle, permutations, combinations, and recurrence relations.

CO3. Analyze graph properties, determine connectivity, and identify Eulerian and Hamiltonian paths in various graph models.

CO4. Apply the concepts of groups, subgroups, homomorphisms, and verify properties of rings and fields.

CO5. Apply lattice theory and Boolean algebra concepts to solve problems in computer science and digital circuit design.

Textbooks:

T1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Tata McGraw Hill Pub.Co.Ltd, Seventh Edition, Special Indian Edition, New Delhi, 2011.

T2. Tremblay J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd., Third Edition, New Delhi, 2013.

References:

R1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.

R2. Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2019.

R3. Thomas Koshy," Discrete Mathematics with Applications", Elsevier Publications, Boston, 2004.

R4. Grimaldi R.P., "Discrete and Combinatorial Mathematics", Pearson Education Pvt.Ltd. 5th Edition, Singapore,2004.

Web links and Video Lectures (e-Resources):

W1. https://www.researchgate.net/publication/1922282_Discrete_Mathematics_for_Computer_Science_Some_Notes

W2. https://nptel.ac.in/courses/111/107/111107058/

W3. https://nptel.ac.in/courses/106/106/106106183/

W4. https://www.pdfdrive.com/discrete-mathematics-for-computer-science-e17017833.html

W5. https://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

CO-PO & PSO-MAPPING - DISCRETE MATHEMATICS													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2	2	-	1	-	-	-	1	-	1	-	-
CO2	3	2	2	-	1	-	-	-	1	-	1	-	-
CO3	3	2	2	-	1	-	-	-	1	-	1	-	-
CO4	3	2	2	-	-	-	-	-	1	-	-	-	-
CO5	3	2	2	-	-	-	-	-	1	-	-	-	-
AVG	3	2	2	-	0.6	-	-	-	1	-	0.6	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No correlation													

OPERATING SYSTEMS			
Course Code:	**25UITT41**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To understand the functions of operating systems, processes, threads, analyze the scheduling algorithms, process synchronization, deadlocks and various memory management schemes. To familiarize with the basics of virtual machines and Mobile OS like iOS& Android.

UNIT 1	**INTRODUCTION**	**9**

Computer System - Elements and organization; Operating System Overview - Objectives and Functions - Evolution of Operating System; Operating System Structures – Operating System Services - User Operating System Interface - System Calls – System Programs - Design and Implementation - Structuring Methods.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**PROCESS MANAGEMENT**	**9**

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter- Process Communication; CPU Scheduling - Scheduling Criteria - Scheduling Algorithms: Threads - Multithread Models – Threading Issues; Process Synchronization - The Critical-Section Problem - Synchronization Hardware – Semaphores – Mutex - Classical Problems of Synchronization - Monitors; Deadlock - Methods for Handling Dead- locks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**MEMORY MANAGEMENT**	**9**

Main Memory - Swapping - Contiguous Memory Allocation – Paging - Structure of the Page Table - Segmentation, Segmentation with paging; Virtual Memory - Demand Paging – Copy on Write - Page Replacement - Allocation of Frames –Thrashing.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**STORAGE MANAGEMENT**	**9**

Mass Storage system – Disk Structure - Disk Scheduling and Management; File- System Interface - File Concept - Access Methods - Directory Structure - Directory Organization - File System Mount- ing - File Sharing and Protection; File System Implementation - File System Structure - Directory Implementation - Allocation Methods - Free Space Management - I/O Systems – I/O Hardware, Application I/O Interface, Kernel I/O subsystem.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	VIRTUAL MACHINES AND MOBILE OS	9
Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and Implementations, Virtualization and Operating-System Components - Mobile OS - iOS and Android.		
Teaching Learning Process	Pedagogy: Chalk & Talk, PPT	
	RBT Level: Understand	
	Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study

Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Discuss the concepts, architecture, functions and design of an operating system, including its services, system calls, system programs.

CO2. Implement and apply scheduling algorithms, process synchronization methods, multithreading concepts, and deadlock prevention and avoidance techniques in operating system environments.

CO3. To compare and contrast various memory management schemes.

CO4. Discuss the disk structure, disk management, and apply various disk scheduling algorithms. Explain the concepts of files, including access methods, directory structure, file sharing, protection, and file system implementation, kernel I/O subsystems,

CO5. Explain the concept of virtualization and compare iOS and Android Operating Systems.

Textbooks:

T1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley and Sons Inc., 11thEdition, 2024.

T2. Andrew S Tanenbaum, "Modern Operating Systems" , Pearson, New Delhi,5thEdition, 2022.

References:

R1. Ramaz Elmasri, A. Gil Carrick and David Levine, "Operating Systems – A Spiral Approach" Tata McGraw Hill Edition, 2010.

R2. William Stallings, "Operating Systems - Internals and Design Principles", Prentice Hall, 7th Edition, 2018.

R3. Achyut S.Godbole and Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.

Web links and Video Lectures (e-Resources):

W1. https://nptel.ac.in/courses/106106144

W2. https://nptel.ac.in/courses/106105214

CO-PO & PSO–Mapping-OPERATING SYSTEMS													
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	**3**	**1**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO2	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO3	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO4	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**
CO5	**3**	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**-**
AVG	**3**	**1.6**	**2.2**	**1.4**	**1.6**	**-**	**-**	**-**	**-**	**-**	**2**	**0.6**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No correlation													

DATABASE MANAGEMENT SYSTEMS			
Course Code:	**25UITT42**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To understand the concepts of Database Management System (DBMS), relational model, SQL queries, database storage structure, transaction processing and concurrency control.

UNIT 1	**INTRODUCTION**	**9**

Introduction to Database Systems: Overview – Data Models – Database System Architecture – History of Database Systems. Entity-Relationship Model: Basic Concepts – Constraints – Keys – Design Issues – Entity Relationship Diagram – Weak Entity Sets – Extended E-R Features – Design of an E-R Database Schema.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 2	**RELATIONAL MODEL**	**9**

Structure of Relational Databases – Relational Algebra – Extended - Relational Algebra Operations – Modification of Database – Views – Tuple Relational - Calculus – Domain Relational Calculus. SQL: Background – Basic Structure – Set - Operations – Aggregate Functions – Null Values – Nested Sub-queries – Views – Complex Queries – Modification of the database –Joined Relations – Data-Definition Language.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**INTEGRITY AND SECURITY**	**9**

Domain Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL. Relational-Database Design: Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**STORAGE AND FILE STRUCTURES**	**9**

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary Storage – Storage Access – File Organization. Indexing and Hashing: Basic Concepts –Static Hashing – Dynamic Hashing.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**TRANSACTIONS**	**9**

Transaction concept – Transaction State – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Testing for Serializability. Concurrency Control: Lock-Based Protocols – Timestamp- Based Protocols. Recovery System: Failure Classification – Storage Structure – Recovery and Atomicity – Log- Based Recovery – Shadow Paging.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

Total Periods	45 hrs

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study

Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Apply the fundamental principles and significance of DBMS, and utilize ER model to a relational model to design a database.

CO2. Apply the concept of relational model to implement DDL and DML queries.

CO3. Implement database authorization and security measures while minimizing table duplication through normalization techniques.

CO4. Apply the concept of indexing and hashing techniques in file organization and understand the different physical storage media.

CO5. Explain the concept of ACID properties, transaction processing, concurrent transaction processing and recovery from failures.

Textbooks:

T1. Silberschatz, Korth and Sudarshan, "Database System Concepts", McGraw- Hill Higher Education, 7th Edition, 2021.

T2. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TATA Mc Graw Hill 3rd Edition.

References:

R1. Fred R McFadden, Jeffery A Hoffer and Mary B. Prescott, "Modern Database Management", Addison Wesley,7th Edition, 2004.

R2. Elmasri and Navathe, "Fundamentals of database Systems", Addison Wesley, 6th Edition, 2010.

R3. JefreyD.Ulman and Jenifer Widom, "A First Course in Database Systems", Pearson Education Asia, 2001.

R4. Bipin C Desai, "An Introduction to Database Systems", Galgotia Publications Pvt Limited, 2003.

Web links and Video Lectures (e-Resources):

W1. Database Management System: https://nptel.ac.in/courses/106105175

CO-PO & PSO–Mapping- DATABASE MANAGEMENT SYSTEMS

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	1	1	-	-	-	-	2	3	2	2
CO2	3	3	3	3	3	-	-	-	-	2	3	2	2
CO3	3	2	2	1	3	-	-	-	-	1	3	2	2
CO4	3	2	3	2	3	-	-	-	-	1	3	2	2
CO5	3	2	2	2	3	-	-	-	-	1	3	2	2
AVG	3	2.4	2.6	1.8	2.6	-	-	-	-	1.4	3	2	2

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

SOFTWARE ENGINEERING			
Course Code:	**25UITT43**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To learn, practice and apply the software engineering industry practices.
- To acquire knowledge on the various techniques, tools and models for each of the phases of software development.

UNIT 1	INTRODUCTION TO SOFTWARE ENGINEERING	9

Software Engineering Discipline – Evolution and Impact – Software Development projects – Emergence of Software Engineering – Computer System Engineering Software Life Cycle Models: classic Waterfall model – Iterative Lifecycle model – prototyping model – Evolutionary model – spiral model – Comparison of Life cycle models.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	SOFTWARE PROJECT MANAGEMENT AND REQUIREMENTS ANALYSIS	9

Responsibilities of a Software Project Manager – Project Planning – Metrics for Project Size Estimation – Empirical Estimation Techniques – COCOMO – Halstead's Software Science – Staffing Level Estimation – Scheduling – Organization and Team structures – Staffing – Risk Management – Software Configuration Management - Requirements Analysis and Specification -Requirements Gathering and Analysis – Software Requirements specification – Formal System Specification – Axiomatic Specification - Algebraic Specification – 4GL.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	SOFTWARE DESIGN	9

Outcome of a Design Process – Characteristics of a Good Software Design – Coupling and Cohesion – Approaches to Software Design – Object Oriented Vs Function Oriented Software Design Approaches Function Oriented Software Design: Structured Analysis – Data Flow Diagrams – Applying DFD to Real time systems – Structured and Detailed Design.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Analyze

UNIT 4	CODING AND TESTING	9

Coding – Software Documentation – Testing – Unit Testing – Black Box testing – White Box testing – Debugging – Program Analysis tools – Integration testing – Testing Object Oriented programs-System Testing – Issues.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 5	SOFTWARE RELIABILITY AND QUALITY	9

Software Reliability – Software Quality – ISO 9000 – SEI CMM-Six Sigma - CASE and Software

Maintenance - CASE environment – CASE support in Software Life cycle – Characteristics of CASE tools – characteristics of software maintenance – software reverse engineering – software maintenance process models.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand
Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study

Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain software engineering fundamentals and software life cycle models.

CO2. Apply software project management techniques for cost estimation, scheduling, and resource planning.

CO3. Analyze software design using functional, object-oriented principles, and DFDs.

CO4. Demonstrate software coding, documentation, testing, and debugging techniques.

CO5. Explain software quality, reliability, CASE tools, and software maintenance concepts.

Textbooks:

T1. Rajib Mall, "Fundamentals of Software Engineering",5th Edition, PHI Learning, Pvt. Ltd, 2018

T2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, Third edition, 2008.

References:

R1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", McGraw- Hill International Edition, Seventh edition, 2009

R2. S. L. Pfleeger and J.M. Atlee, "Software Engineering Theory and Practice", Pearson Education, Third edition, 2008

R3. Ian Sommerville, "Software Engineering", Pearson Education, Eighth edition, 2008

Web links and Video Lectures (e-Resources):

W1. https://nptel.ac.in/courses/106105087

W2. https://nptel.ac.in/courses/106105182

CO-PO & PSO–Mapping- SOFTWARE ENGINEERING

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	2	-	-	-	-	-	2	1	-
CO2	3	3	2	-	2	-	-	-	-	-	2	1	-
CO3	3	3	3	-	-	-	-	-	-	-	2	1	-
CO4	3	3	3	-	2	-	-	-	-	-	2	1	-
CO5	3	3	2	-	-	-	-	-	-	-	2	1	-
AVG	3	3	2.4	-	1.2	-	-	-	-	-	2	1	-

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

INFORMATION CODING TECHNIQUES			
Course Code:	**25UITT44**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:0**	**Credits:**	**3**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**Electronics and Communication Engineering**		

Course Objectives:

- To understand the coding principles and different security algorithms.
- To analyze the compression techniques.

UNIT 1	**INFORMATION ENTROPY FUNDAMENTALS**	**9**

Information– entropy-properties of information and entropy-relation between information and probability-mutual and self-information-coding theory-code efficiency and redundancy- Shannon's theorem- construction of basic codes-Shannon and Fanon coding, Huffman coding– arithmetic coding.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**DATA AND VOICE CODING**	**9**

Lossless predictive-Run-length-Ziv-Lempel coding-voice coding-modulation –linear predictive coding-silence coding and sub-band coding.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**IMAGE AND VIDEO COMPRESSION**	**9**

Quantization-JPEG standards-motion compensation-MPEG-1- MPEG-2-MPEG-4, H.26X standards.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**ERROR CONTROL CODING**	**9**

Linear Block Codes for Error Correction-Cyclic Codes-Bose-Choudhuri Hocquenghem codes-Convolution Codes.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**CRYPTOGRAPHY**	**9**

Overview of encryption techniques- symmetric cryptography-Data Encryption Standard (DES)-International Data Encryption Algorithm (IDEA)-RC Ciphers-Public-key algorithm-RSA algorithm-Pretty Good Privacy-One-way Hashing.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand
	Total Periods **45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study

Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain the fundamentals of information entropy, coding theory, and source coding techniques.

CO2. Apply data and voice coding techniques for efficient data compression and transmission.

CO3. Apply image and video compression techniques using different standards such as JPEG, MPEG, and H.26X.

CO4. Demonstrate the principles of error control coding techniques for reliable communication systems.

CO5. Explain cryptographic techniques and apply encryption algorithms for secured communication.

Textbooks:

T1. Ze-Nian Li and Mark S.Drew, Fundamentals of Multimedia, Pearson Education, 2nd Edition 2014.

T2. Ranjan Bose, "Information theory, coding and cryptography", Tata McGraw Hill, 3rd Edition, 2016.

T3. Andrew J. Viterbi, "Information Theory and Coding", McGraw Hill, 1982.

T4. Dr. Chitode J S, "Information Theory and Coding Techniques", Technical Publications, 2019.

References:

R1. John G.Proakis, Digital Communications,2nd Edition, McGrawHill,1989.

R2. K.Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers, 2000.

Web links and Video Lectures (e-Resources):

W1. https://nptel.ac.in/courses/117101053

CO-PO & PSO-Mapping- INFORMATION CODING TECHNIQUES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	2	-	-	-	1	2	-	-	-
CO2	2	3	2	1	3	-	-	-	1	2	-	-	-
CO3	2	3	2	2	3	-	-	-	1	2	-	-	-
CO4	3	3	2	2	2	-	-	-	1	2	-	-	-
CO5	3	2	2	1	3	1	1	-	1	2	-	-	-
AVG	2.6	2.6	1.8	1.2	2.6	0.2	0.2	-	1	2	-	-	-

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

DESIGN AND ANALYSIS OF ALGORITHMS			
Course Code:	**25UITI41**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**3:0:2**	**Credits:**	**4**
Total Teaching Periods:	**60**	**CAM+ ESM Marks:**	**50+50=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To acquaint students with algorithm techniques when programming for the storage and Manipulation of data.
- The concept of data abstraction and the problem of building implementations of abstract data types are emphasized.

UNIT 1	**INTRODUCTION**	**9**

Algorithm: Definition and Pseudocode - Asymptotic Notations – Worst Case, Best Case And Average Case Analysis; Big Oh, Omega and Theta Notations; Analyzing Control Structures. Analysis of Sorting and Searching algorithms: Heap, Shell, Radix, Insertion, Selection and Bubble Sort; Sequential, Binary And Fibonacci Search. Recursive Algorithms, Analysis of Non- Recursive and Recursive Algorithms, Solving Recurrence Equations.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**DIVIDE AND CONQUER, GREEDY APPROACHES**	**9**

Divide and Conquer: General Method – Binary Search – Maximum And Minimum – Merge Sort - Quick Sort – Strassen's Matrix Multiplication. Greedy Method: General Method – Knapsack Problem – Minimum Spanning Tree Algorithms – Single Source Shortest Path Algorithm – Scheduling, Optimal Storage on Tapes, Optimal Merge Patterns.

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**DYNAMIC PROGRAMMING**	**9**

General Method – Multi-Stage Graphs – All Pair Shortest Path Algorithm – 0/1 Knapsack and Travelling Salesman Problem – Chained Matrix Multiplication

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**BACKTRACKING**	**9**

The general method – 8-queens problem – sum of subsets – graph coloring – Hamiltonian cycle – Knapsack problem.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**BRANCH AND BOUND METHOD**	**9**

Least Cost (LC) search – the 15-puzzle problem – control abstractions for LC- Search – Bounding – FIFO Branch-and-Bound - 0/1 Knapsack problem – Traveling Salesman Problem. Introduction to NP-Hard and NP-Completeness.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Analyze

	Total Periods	**45 hrs**

LIST OF EXPERIMENTS

1. Implement binary search using Divide-and-Conquer technique.
2. Implement quick sort and merge sort using Divide-and-Conquer technique.
3. Find the maximum and minimum element in an array using Divide-and-Conquer technique.
4. Implement Strassen's multiplication using Divide and Conquer technique.
5. Implement Knapsack problem using Greedy technique.
6. Implement Single-Source Shortest Path algorithm using Greedy technique.
7. Implement Prim's algorithm using greedy technique.
8. Implement Kruskal algorithm using greedy technique.
9. Implement Multi-Stage Graphs using Dynamic Programming technique.
10. Implement Floyd's algorithm using Dynamic Programming technique.
11. Implement Traveling Salesman algorithm using Dynamic Programming technique.
12. Implement 8 Queens algorithm using Backtracking technique.
13. Implement Hamiltonian cycle algorithm using Backtracking technique.
14. Implement Traveling Salesman Problem using Branch and Bound Technique

(Total Periods: 15)

Total Periods	**Theory 45 + Practical 15 = 60 Hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study

Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Describe and derive the time and space complexities of algorithms.

CO2. Apply the divide-and-conquer and greedy techniques

CO3. Formulate and design the Dynamic Programming approach.

CO4. Apply Backtracking technique to solve real world problems.

CO5. Design and analyze Branch and Bound technique.

Textbooks:

T1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications Pvt. Ltd., 2008..

T2. Gilles Brassard and Paul Bratley, Fundamentals of Algorithmics, Theory and Practice PHI, 2010.

T3. Thomas H. Corman, Charles E. Leiserson, Ronald and L. Rivest, Introduction to Algorithms, Prentice-Hall of India, 2nd Edition, 2003.

References:

R1. Gajendra Sharma, "Design and Analysis of Algorithms", Khanna Publishing House, New Delhi, 4th Edition, 2015.

R2. Gilles Brassard and Paul Bratley, "Fundamentals of Algorithms", PHI, 1997. (UNIT I)

R3. AnanyLevitin, "Introduction to Design and Analysis of Algorithms", Pearson Education, 2005

R4. Thomas H. Corman, Charles E. Leiserson, Ronald and L. Rivest, "Introduction to Algorithms",

Prentice-Hall of India, Second edition, 2003.
R5. Richard Johnson baugh and Marcus Schaefer, "Algorithms", Pearson Education, 2004. (UNIT V).

Web links and Video Lectures (e-Resources):

W1. Design and Analysis of Algorithms: https://nptel.ac.in/courses/106101059
W2. Introduction Design and Analysis of Algorithms: https://nptel.ac.in/courses/106106131
W3. Overview of DAA: https://nptel.ac.in/courses/106101060

CO-PO & PSO–Mapping- DESIGN AND ANALYSIS OF ALGORITHMS

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	-	-	2	-	-	-	-	-	-	2	2
CO2	3	3	-	1	2	-	-	-	-	-	-	2	2
CO3	3	3	-	1	2	-	-	-	-	-	-	2	2
CO4	3	3	-	2	2	-	-	-	-	-	-	2	2
CO5	3	3	-	-	2	-	-	-	-	-	-	2	2
AVG	3	3	-	0.8	2	-	-	-	-	-	-	2	2

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

OPERATING SYSTEMS LAB			
Course Code:	**25UITP41**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**0:0:2**	**Credits:**	**1**
Total Teaching Periods:	**30**	**CAM + ESE Marks:**	**60+40=100**
Teaching Department:	**Information Technology**		

Course Objectives:

• To install UNIX & Windows operating system, implement the various CPU scheduling algorithms, deadlock avoidance, deadlock detection algorithms, paging, file organization techniques and disk scheduling algorithms.

Practical Exercises:	**Periods : 30 Hrs**

LIST OF EXPERIMENTS

1. Installation of windows/UNIX operating system.
2. Illustrate UNIX commands and Shell Programming.
3. Implement the following Process Management System Calls: Fork, Exit, Getpid, Wait, Close.
4. Write programs to implement the various CPU scheduling algorithms.
5. Illustrate the Inter Process Communication (IPC) strategy.
6. Implement mutual exclusion by Semaphore.
7. Write a program to avoid Deadlock using Banker's Algorithm.
8. Write a program to Implement Deadlock Detection Algorithm.
9. Write a program to implement Threading.
10. Implement the paging Techniques.
11. Write program to implement the following memory allocation methods. a. First Fit b. Worst Fit c. Best Fit
12. Write a program to implement the various page replacement algorithms.
13. Write a program to implement the various file organization techniques.
14. Implement the following File allocation strategies a. Sequential b. Indexed c. Linked
15. Write a program for the implementation of various disk scheduling algorithms.
16. Install any guest operating system like Linux using VMware.

(Total Periods: 30)

Course Outcomes:

After Successful completion of this course, the student should be able to

CO1. Annotate fundamental Linux commands, shell scripts and system call programs in an operating system.

CO2. Implement CPU scheduling, process synchronization, inter-process communication, and deadlock handling algorithms.

CO3. Implement memory management techniques, including paging, memory allocation, and page replacement algorithms

CO4. Implement file management and disk scheduling algorithms using appropriate file allocation techniques.

CO5. Install and configure virtualization software and guest operating systems to create and manage virtual machine environments.

CO-PO & PSO MAPPING: OPERATING SYSTEM LAB

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

1–Low, 2–Medium, 3–High, '-' –No correlation

DATABASE MANAGEMENT SYSTEMS LAB			
Course Code:	**25UITP42**	**Course Type:**	**PC**
Teaching Periods / Week (L:T:P):	**0:0:2**	**Credits:**	**1**
Total Teaching Periods:	**30**	**CAM + ESM Marks:**	**60+40=100**
Teaching Department:	**Information Technology**		

Course Objectives:

- To understand SQL, JDBC and ODBC connectivity.
- To design and develop databases for real-time applications.

Practical Exercises:	**Periods : 30 Hrs**

LIST OF EXPERIMENTS

1.Study of Database Concepts

2.Implementation of BASIC commands

3.Implementation of DDL commands

4.Implementation of DML commands

5.Implementation of DQL commands

6.Implementation of DCL commands

7.Implementation of TCL commands

8.Implementation of Built in functions

9.Implementation of Aggregate functions

10.Implementation of set operations, joins, nested sub queries

11. Create a set of tables, add foreign key constraints and incorporate referential integrity.

12.Query the database tables using different 'where' clause conditions and also implement aggregate functions.

13. Write user defined functions and stored procedures in SQL.

14. Write SQL Triggers for insert, delete, and update operations in a database table.

15. Create View and index for database tables with a large number of records.

16. Design and develop any three real life database applications from the following list

(a)Library Information System

(b)Logistics Management System

(c)Students' Information System

(d)Ticket Reservation System

(e)Hospital Management System

(f)Inventory Management for a Grocery Shop

(g) Employee Information System

(h)Property Management system

•Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application.

•Apply Normalization rules in designing the tables in scope.

• Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features.

• Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer.

•Ability to showcase ACID Properties with sample queries with appropriate settings.

(Total Periods: 30)

Course Outcomes:

After Successful completion of this course, the student should be able to

CO1. Implement the DDL and DML queries to construct and manage relational databases.

CO2. Implement DQL, TCL commands, built-in functions, and aggregate functions to manage database transactions

CO3. Use the set and joins operation to retrieve and combine data from multiple tables.

CO4. Implement nested subqueries and views to solve complex database queries.

CO5. Design and develop basic database applications by integrating SQL

CO6. queries with application logic

CO-PO & PSO- MAPPING: DATABASE MANAGEMENT SYSTEMS LAB

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	2	-	-	3	2	3	3	2	2
CO2	3	1	3	2	2	-	-	3	2	1	3	2	2
CO3	2	2	3	2	2	-	-	3	2	1	3	2	2
CO4	3	1	2	2	2	-	-	3	-	1	3	2	2
CO5	3	1	1	2	2	-	-	3	-	1	3	2	2
AVG	2.8	1.6	2.4	2	2	-	-	3	1.2	1.4	3	2	2

1–Low, 2–Medium, 3–High, '-' –No correlation

Mini Project – I			
Course Code:	**25UITW41**	**Course Type:**	**CEC**
Teaching Periods / Week (L:T:P):	**0:0:2**	**Credits:**	**1**
Total Teaching Periods:	**30**	**CAM + ESM Marks:**	**60+40=100**
Teaching Department:	**Information Technology**		

Course Objectives:

- To design and develop software application using software engineering principles.

Practical Exercises:	**Periods : 30 Hrs**

SUGGESTED APPLICATIONS FOR MINI-PROJECT

1.Passport automation system.

2. Book bank system.

3. Exam registration system.

4. Stock maintenance system.

5. Online course reservation system.

6. Airline/Railway reservation system.

7. Software personnel management system.

8. Credit card processing.

9. Recruitment system.

10. Foreign trading system.

11. Conference management system.

12. BPO management system.

13. Library management system.

14. Student information system.

15. Quiz App.

16. Restaurant Website Application

And more..

MINI PROJECT GUIDELINES

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design
8. Test the software system for all the scenarios identified as per the use case diagram
9. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
10. Implement the modified system and test it for various scenarios
11. Preparation of Project Report.

(Total Periods: 30)

Course Outcomes:

After Successful completion of this course, the student should be able to

CO1. Analyze a real-world problem and identify system requirements using systems analysis and design principles.

CO2. Design software solutions by constructing appropriate UML models for the proposed system.

CO3. Develop and implement a software application by applying software engineering principles, coding standards, testing, debugging, and deployment techniques.

CO4. Validate the developed application through systematic testing and evaluate its performance.

CO5. Prepare a comprehensive project report and effectively presentation and project demonstration.

CO-PO & PSO- MAPPING: MINI PROJECT-I

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	1	1	-	1	1	-	1	2	1
CO2	2	2	3	1	2	1	-	3	1	1	1	3	2
CO3	3	2	3	2	3	1	1	3	1	1	2	3	3
CO4	3	2	2	3	2	1	1	3	1	1	2	2	3
CO5	1	1	1	-	1	1	1	3	3	1	1	1	1
AVG	2.4	1.8	2.2	1.4	1.8	1	0.6	2.6	1.4	0.8	1.4	2.2	2

1–Low, 2–Medium, 3–High, '-' –No correlation

PROFESSIONALISM and BASIC APTITUDE			
Common to all Branches			
Course Code:	**25UPCE41**	**Course Type:**	**EEC**
L : T : P:	**0:0:2**	**Credits:**	**0 (Zero Credit)**
Total Periods:	**30 Hours**	**Evaluation:**	**Internal Assessment**
Teaching Department:	**Placement and Training Cell**		
Prerequisite:	Basic proficiency in English communication, fundamental understanding of self-awareness		

Course Objectives:

1. To help students improve communication, teamwork, and time management.
2. To teach professional behaviour and collaborative work skills.
3. To develop problem-solving and leadership skills.
4. To build foundational quantitative aptitude for competitive exams.
5. To prepare students for campus placement aptitude tests.

UNIT 1	ATTITUDE, ADAPTABILITY AND VALUES	6

Attitude: Positive thinking and optimism - Growth mindset vs. fixed mindset - Self-motivation and initiative - Managing negative attitudes and stress

Adaptability: Change management - Cognitive flexibility - Continuous learning - Workplace diversity adjustment

Values: Personal vs. professional values - Integrity and honesty - Respect and empathy - Ethical decision-making

Perception and learning: Sensory perception and attention - Factors affecting perception - Types of learning - Learning Styles and Strategies.

UNIT 2	LEADERSHIP AND CREATIVITY	6

Leadership: Leadership Styles (Autocratic, Democratic, Laissez-faire) - Effective Communication for Leaders - Decision-Making - Team Motivation and Delegation.

Creativity: Brainstorming Techniques - Innovation and Design Thinking - Problem-Solving Approaches - Imagination and Lateral Thinking.

Reaching Your Potential: Self-Awareness Assessment - Goal Setting Frameworks - Time Management Techniques - Continuous Improvement Mindset.

UNIT 3	GENERAL APTITUDE - NUMBER SYSTEMS	6

Number System: Types of Numbers - Prime and Composite Numbers -Place Value and Face Value - Conversions between Number Bases

HCF & LCM: Prime Factorization Method - Division Method - Relationship between HCF and

LCM - Word Problems on HCF and LCM

Factorial Concepts: Definition and Notation of Factorial - Factorial Identities - Factorial in Permutations and Combinations - Trailing Zeros in Factorials

UNIT 4	QUANTITATIVE APTITUDE - I	6

Profit and Loss: Cost Price and Selling Price - Profit and Loss Percentage - Marked Price and Discount - Successive Transactions

Percentage, Ratio and Proportion: Percentage Basics and Calculations - Ratio Simplification and Comparison - Direct and Inverse Proportion - Percentage to Ratio Conversions

Simple Interest and Compound Interest: Simple Interest Formula and Calculation - Compound Interest Basics - Difference between SI and CI - Time and Rate-Based Problems

UNIT 5	PROBABILITY AND COMBINATORICS	6

Probability: Basic Probability - Sample Space - Independent and Dependent Events - Complementary Events

Permutation and Combination: Fundamental Principle of Counting - Permutations - Combinations - Circular Permutations

Pipe and Cistern: Inlet and Outlet Pipes - Filling and Emptying Time - Pipes Working Together - Alternate Inlet–Outlet Problems

Total Periods : 30

Course Outcomes:

After successful completion of this course, the student should be able to:

CO1. Apply positive attitude, adaptability, ethical values, and effective perception and learning strategies for personal and professional development.

CO2. Build leadership, creativity, and self-awareness to communicate effectively, solve problems, and achieve continuous growth

CO3. Apply number system concepts, HCF & LCM methods, and factorial principles to solve quantitative problems efficiently

CO4. Calculate profit/loss, percentage, ratio, proportion, and interest problems to make informed financial and quantitative decisions.

CO5. Solve problems on probability, permutations, combinations, and pipe- cistern scenarios using logical and mathematical reasoning

Textbooks:

T1. Quantitative aptitude for competitive exams by S.Chand, Dr.R.S.Aggarwal

T2. Quantitative aptitude for CAT by Arun Sharma, Tata McGrew Hill.

References:

R1. Rapid Quantitative Aptitude by Er.Deepak Agarwal and Mr.D.PGupta

R2. Numerical Ability and Quantitative aptitude for Competitive examinations by P.K.Mittal

WEB RESOURCES :

CO-PO& PSO–Mapping- PROFESSIONALISM and BASIC APTITUDE

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	3	-	-	-	3	2	2	2	2	2
CO2	2	1	1	1	1	1	1	1	-	-	-
CO3	2	2	2	-	-	-	-	-	-	-	2
CO4	2	-	2	-	-	-	-	2	-	-	2
CO5	2	2	2	-	-	-	-	-	2	-	2
AVG	1.6	1.6	1.4	0.2	0.2	0.8	0.6	1	0.8	0.4	1.6

ENTREPRENEURIAL SKILLS AND CONCEPTS			
(Common to All Branches of UG Engineering Programs)			
Course Code:	**25UMCC41**	**Course Type:**	**Mandatory Course (Audit)**
Teaching Periods / Week (L:T:P):	**2:0:0**	**Credits:**	**0 (Zero)**
Total Teaching Periods:	**30**	**Evaluation:**	**Internal Assessment**
Teaching Department:	**MBA**		
Prerequisite:	Knowledge in Computing Skills		

Course Objectives:

- To create a learning experience to enable the students to face the challenges of starting new ventures.
- To prepare the students for starting new businesses and the skills for managing existing family businesses.
- To gain knowledge in business plan preparation by using various sources of finance and to become entrepreneurs in different fields.

UNIT 1	INTRODUCTION TO ENTREPRENEURSHIP	6

Introduction to Entrepreneurship: Concept, Significance, Theories and Models of Entrepreneurship Development - Traits and Characteristics, Functions, Types - Entrepreneurial Processes - Problems - Capacity building - Risk Analysis - Scope of Entrepreneurship in India.

UNIT 2	ENTREPRENEURIAL ENVIRONMENT FOR START-UP ENTERPRISES	6

Entrepreneurial Environment for Start-up Enterprises: Significance - Internal and External Environment forces - Entrepreneurial Culture and Society - EDP: Objectives, Features, Steps and Issues in EDP Process - Role of Institutions and Government in EDP.

UNIT 3	DEVELOPING START-UP ENTERPRISES	6

Developing Start-up Enterprises: Developing a Business Idea: Opportunity, Methods, and Creativity - Deciding to setup a Start-up Enterprise: Effectual Reasoning, Forms, Size and Location - Entrepreneurial skills and Competences - Feasibility Study: Market Survey, Techno-Economic feasibility and Preparing Project Report - Financial Requirements.

UNIT 4	STEPS IN PROMOTING START-UP MICRO-ENTERPRISES	6

Steps in Promoting Start-up Micro-Enterprises: Entrepreneurial Success in Rural Areas - Establishing Entrepreneurial System - Assistance and Sickness - Institutions Supporting and providing Financial Assistance: SSI, KVIC, MSME-DO, NSIC, NIESBUD, IIE, SIDC, SDIs, DICs NGOs, Industry Association, SIDBI and SFCs - Self-help Groups - Technological Up-gradation - Challenges.

UNIT 5	MANAGING A NEW OR START-UP ENTERPRISE	6

Managing a New or Start-up Enterprise: Management - HRM, Marketing, Financial Management, Production and Operations Management in a New or Start-up Enterprise.

Total Periods: 30

Course Outcomes:

After successful completion of this course, the student should be able to:

CO1. Explain the concepts, theories, characteristics, and scope of entrepreneurship.

CO2. Analyze the entrepreneurial environment, EDP process, and institutional support for start-up enterprises.

CO3. Develop business ideas and prepare feasibility studies and project reports for start-up enterprises.

CO4. Examine the promotion and support systems available for micro and rural enterprises.

CO5. Apply management principles in HRM, marketing, finance, production, and operations for start-up enterprises.

Textbooks:

T1. Saravanavel, P. (2020): Entrepreneurial Development, Margham Publication, Chennai.

T2. Prasanna Chandra, (2019): Protect Preparation, Appraisal, Implementation, Tata McGraw Hill. New Delhi.

References:

R1. Srinivasan, N.P. & Gupta, C.B. (2017): Entrepreneurial Development, Sultan Chand & Sons

R2. Barringer, Bruce R. (2008): Entrepreneurship: Successfully launching new ventures, Pearson Education, India.

R3. Drucker, Peter F., and Peter Ferdinand Drucker (2007): Innovation and Entrepreneurship: Practice and Principles, Routledge.

Web Links and Video Lectures (e-Resources):

CO-PO & PSO Mapping - ENTREPRENEURIAL SKILLS AND CONCEPTS

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	2	-	1	1	2	2	-	-
CO2	2	3	-	1	-	2	-	1	1	2	2	-	-
CO3	2	3	3	2	1	-	-	1	2	3	2	-	-
CO4	2	2	1	-	-	3	2	1	1	2	2	-	-
CO5	2	2	3	1	1	-	-	2	2	3	2	-	-
AVG	2.2	2.4	1.4	0.8	0.4	1.4	0.4	1.2	1.4	2.4	2	-	-

1 - Low, 2 - Medium, 3 - High

B.TECH. Information Technology (Autonomous Reg 2025)

CURRICULUM FROM THE ACADEMIC YEAR 2025-26

HONORS DEGREE

B.Tech. IT. (Honors) in Information Technology

(Data Science)

HONOR COURSES									
SEM	**Course Code**	**Course Title**	**Periods**				**MARKS**		
			L	**T**	**P**	**Credits**	**CAM**	**ESM**	**TM**
Theory Courses									
III	25UITH01	Exploratory Data Analysis	3	1	0	4	40	60	100
IV	25UITH02	Business Analytics	3	1	0	4	40	60	100
V	25UITH03	Computer Vision	3	1	0	4	40	60	100
VI	25UITH04	Natural Language Processing	3	1	0	4	40	60	100
VII	25UITH05	Neural Networks and Deep Learning	3	1	0	4	40	60	100
						20			

BUSINESS ANALYTICS			
Course Code:	**25UITH02**	**Course Type:**	**Honor**
Teaching Periods / Week (L:T:P):	**3:1:0**	**Credits:**	**4**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To develop the ability to apply analytics techniques in business domains such as marketing, human resources, and supply chain management.

UNIT 1	**ANALYTICS AND DATA SCIENCE**	**9**

Analytics and Data Science – Analytics Life Cycle – Types of Analytics – Business Problem Definition – Data Collection – Data Preparation – Hypothesis Generation – Modeling – Validation and Evaluation – Interpretation – Deployment and Iteration.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Understand

UNIT 2	**DATA WAREHOUSES AND DATA MART**	**9**

Data Warehouses and Data Mart - Knowledge Management –Types of Decisions - Decision Making Process - Decision Support Systems – Business Intelligence –OLAP – Analytic functions

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**BUSINESS FORECASTING**	**9**

Introduction to Business Forecasting and Predictive analytics - Logic and Data Driven Models – Data Mining and Predictive Analysis Modelling –Machine Learning for Predictive analytics.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**HUMAN RESOURCES**	**9**

Human Resources – Planning and Recruitment – Training and Development - Supply chain network - Planning Demand, Inventory and Supply – Logistics – Analytics applications in HR & Supply Chain - Applying HR Analytics to make a prediction of the demand for hourly employees for a year.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**MARKETING STRATEGY**	**9**

Marketing Strategy, Marketing Mix, Customer Behaviour –selling Process – Sales Planning – Analytics applications in Marketing and Sales - predictive analytics for customers' behaviour in marketing and sales.

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Explain the real-world business problems and model with analytical solutions.

CO2. Identify the business processes for extracting Business Intelligence

CO3. Apply predictive analytics for business fore-casting

CO4. Apply analytics for supply chain and logistics management

CO5. Use analytics for marketing and sales.

Textbooks:

T1. R. Evans James, Business Analytics, 2nd Edition, Pearson, 2017

T2. R N Prasad, Seema Acharya, Fundamentals of Business Analytics, 2nd Edition, Wiley, 2016

T3. Philip Kotler and Kevin Keller, Marketing Management, 15th edition, PHI, 2016

T4. VSP RAO, Human Resource Management, 3rd Edition, Excel Books, 2010.

T5. Mahadevan B, "Operations Management -Theory and Practice", 3rd Edition, Pearson Education, 2018.

References:

R1. Galit Shmueli, Peter C. Bruce, Nitin R. Patel and Kenneth C. Lichtendahl Jr., Data Mining for Business Analytics: Concepts, Techniques and Applications in Python, 4th Edition, Wiley, 2023.

R2. Mahadevan B., Operations Management: Theory and Practice, 4th Edition, Pearson Education, 2022.

R3. Philip Kotler, Kevin Lane Keller and Alexander Chernev, Marketing Management, 16th Edition, Pearson Education, 2022.

Web links and Video Lectures (e-Resources):

Online Courses/NPTEL/SWAYAM:

NPTEL – Business Analytics for Management Decision

CO-PO & PSO-MAPPING - BUSINESS ANALYTICS

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	1	1	-	-	1	2	1	1	2	1
CO2	3	3	3	2	3	-	-	1	2	2	2	2	1
CO3	2	2	3	3	2	-	-	3	1	1	1	1	2
CO4	2	1	1	2	2	-	-	3	3	2	2	1	2
CO5	2	3	2	3	2	-	-	3	3	1	1	1	1
AVG	2.2	2.2	2.4	2.2	2.0	-	-	2.2	2.2	1.4	1.4	1.4	1.4

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

LIST OF EXPERIMENTS

1. Use MS-Excel and Power-BI to perform the following experiments using a Business data set, and make presentations.
2. Students may be encouraged to bring their own real-time socially relevant data set.

I Cycle – MS Excel

1. Explore the features of Ms-Excel.

(i) Get the input from user and perform numerical operations (MAX, MIN, AVG, SUM, SQRT, ROUND)

ii) Perform data import/export operations for different file formats.

2. Perform statistical operations - Mean, Median, Mode and Standard deviation, Variance, Skewness, Kurtosis
3. Perform Z-test, T-test & ANOVA
4. Perform data pre-processing operations i) Handling Missing data ii) Normalization
5. Perform dimensionality reduction operation using PCA, KPCA & SVD 120
6. Perform bivariate and multivariate analysis on the dataset.
7. Apply and explore various plotting functions on the data set.

II Cycle – Power BI Desktop

8. Explore the features of Power BI Desktop
9. Prepare & Load data
10. Develop the data model
11. Perform DAX calculations
12. Design a report
13. Create a dashboard and perform data analysis
14. Presentation of a case study.

B.TECH. Information Technology (Autonomous R 2025)

CURRICULUM FROM THE ACADEMIC YEAR 2025-26

B.Tech. IT -Minor Courses offered to other Departments (MECH, ECE, EEE, RA,FT)

Minor in Full Stack Web Development

MINOR COURSES									
SEM	Course Code	Course Title	Periods			Credits	MARKS		
			L	T	P		CAM	ESM	TM
Theory									
III	25UITM01	Web Programming I	3	1	0	4	40	60	100
IV	25UITM02	Web Programming II	3	1	0	4	40	60	100
V	25UITM03	Fundamentals of Cloud Computing	3	1	0	4	40	60	100
VI	25UITM04	Fundamentals of UI and UX Design	3	1	0	4	40	60	100
VII	25UITM05	Fundamentals of Full Stack Web Development	3	1	0	4	40	60	100
						20			

WEB PROGRAMMING II			
Course Code:	**25UITM02**	**Course Type:**	**Minor**
Teaching Periods / Week (L:T:P):	**3:1:0**	**Credits:**	**4**
Total Teaching Periods:	**45**	**CAM+ ESM Marks:**	**40+60=100**
Teaching Department:	**INFORMATION TECHNOLOGY**		

Course Objectives:

- To familiarize server-side scripting concepts using PHP and Servlets. To learn the development of dynamic web applications and database connectivity for building simple web applications.

UNIT 1	**PHP Basics and Introduction**	**9**

Introduction to PHP – Working Principle of PHP – Variables, Constants – Operators – Control Structures – Looping – Arrays – Strings – Functions – Simple PHP Scripts – PHP with HTML Integration

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 2	**Advanced PHP**	**9**

File Handling – File Uploading – Email Basics – Email with Attachments – Sessions – Cookies – Form Processing – Introduction to MySQL – Database Connectivity using PHP

Teaching Learning Process	Pedagogy :Chalk & Talk, PPT
	RBT Level: Apply

UNIT 3	**PHP & Database Applications**	**9**

CRUD Operations using PHP and MySQL – Dynamic Web Pages – Database Driven Applications – Simple Web Application Development

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 4	**Servlets**	**9**

Introduction to Java Servlets – Servlet Architecture – Servlet Life Cycle – Handling Forms using GET and POST – Sessions in Servlets – Cookies – Request and Response Objects

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply

UNIT 5	**Introduction to JDBC**	**9**

Database Connectivity – Executing SQL Queries – ResultSet Handling – Building Simple Interactive Web Applications – Integration of Servlets with Database

Teaching Learning Process	Pedagogy: Chalk & Talk, PPT
	RBT Level: Apply
Total Periods	**45 hrs**

Suggested Activities and Evaluation Methods:

Assignments, Tutorials, Mini Projects, Quiz / MCQ (Gate Related Questions), Case Study
Students' performance in continuous Assessment and Model Exam

Course Outcomes:

CO1. Use PHP basics to develop simple server-side programs..

CO2. Implement PHP features like file handling, sessions, cookies, forms, and database connectivity

CO3. Implement PHP & MySQL to develop CRUD-based web applications.

CO4. Use Servlets for handling web requests and responses using GET/POST methods

CO5. Implement JDBC with Servlets to build database-integrated web applications..

Textbooks:

T1. Learning PHP, MySQL & JavaScript, O'Reilly Media, 7th Edition, 2025.

T2. Internet and World Wide Web: How to Program, Pearson Education, 5th Edition, 2020.

T3. Java Servlet Programming, O'Reilly Media, Reprint Edition, 2021

References:

R1. PHP: The Complete Reference, McGraw Hill Education, Reprint Edition, 2021.

R2. JavaScript: The Complete Reference, McGraw Hill Education, 4th Edition, 2023.

R3. Computer Networking: A Top-Down Approach, Pearson Education, 8th Edition, 2021.

Web links and Video Lectures (e-Resources):

Online Courses/NPTEL/SWAYAM

SWAYAM – Web Based Technologies and Multimedia Applications

CO-PO & PSO-MAPPING - WEB PROGRAMMING -II

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	2	-	-	-	1	1	1	2	-
CO2	3	2	2	1	2	-	-	-	1	1	1	2	-
CO3	3	3	3	1	3	-	-	-	1	1	1	3	1
CO4	3	3	3	2	3	-	-	-	1	1	1	3	1
CO5	3	3	3	2	3	-	-	-	1	1	1	3	1
AVG	3.0	2.6	2.4	1.2	2.6	-	-	-	1.0	1.0	1.0	2.6	0.6

1 – Low, 2 – Medium, 3 – High, '-' – No correlation

Practice exercise:

1. Write PHP programs demonstrating variables, constants, operators, decision-making statements, loops, arrays, strings, and user-defined functions.
2. Create HTML forms and process user input using PHP for operations such as student registration and feedback collection.
3. Develop PHP applications to create, read, write, append, and upload files through web forms.
4. Implement login/logout applications using PHP sessions and cookies to maintain user authentication.
5. Develop a PHP program to send emails with and without attachments through a web interface.
6. Create a PHP application to connect with MySQL database and perform insertion and retrieval of records.
7. Develop a complete student management system to perform Create, Read, Update, and Delete operations using PHP and MySQL.
8. Write Java Servlet programs to process HTML form data using GET and POST methods.
9. Develop servlet-based applications demonstrating session management, cookies, request objects, and response objects.
10. Create a web application using Servlets and JDBC to connect to a database and perform operations such as user login, data insertion, search, and report generation.