SENGUNTHAR ENGINEERING COLLEGE

(AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
Recognized Under Section 2(f) & 12(B) of the UGC Act, 1956
NAAC Accredited with 'A' Grade

TIRUCHENGODE - 637 205 NAMAKKAL (Dt) TAMILNADU

ESTD 2001

ISO 9001 REGISTERED

CURRICULUM&SYLLABI

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

(CHOICE BASED CREDIT SYSTEM)

REGULATIONS–2023

(I - IV SEMESTER)

(For the students admitted from the Academic year 2025-2026 onwards).

(From (III to VIII Semesters) only applicable for the students admitted the Academic Year during 2023-24 and 2024-25)

Estd : 2001

Note: The regulations here under are subject to amendments as may be decided by the Academic Council of the Sengunthar Engineering College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates including those already under going the programme under the same Regulationasmaybedecidedby the Academic Council.

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Chairman - BoS

DEAN (ACADEMICS)
SENGUNTHAR ENGINEERING COLLEGE
TIRUCHENGODE-637 205

PRINCIPAL
SENGUNTHAR ENGINEERING COLLEGE
(AUTONOMOUS)
TIRUCHENGODE - 637 205

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REGULATIONS 2023

CHOICE BASED CREDIT SYSTEM

B. Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

VISION

- To achieve excellence in the field of Artificial Intelligence by focusing knowledge-centric education, innovation and cutting-edge research to address the needs of industry and society.

MISSION

- Impart knowledge in Artificial Intelligence and data Science technologies with innovative thoughts and leadership skills with industry support.
- Educating the students by enhancing knowledge in the Artificial Intelligence domain.
- Strengthening the students to competence in Artificial Intelligence and Data Science through research and innovative activities.
- Enabling the students professional growth through training and self-learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates can

- ✓ Utilize their proficiencies in the fundamental knowledge of basic sciences, mathematics, Artificial Intelligence, data science and statistics to build systems that require management and analysis of large volumes of data.
- ✓ Advance their technical skills to pursue pioneering research in the field of Artificial Intelligence and Data Science and create disruptive and sustainable solutions for the welfare of ecosystems.
- ✓ Think logically, pursue lifelong learning and collaborate with an ethical attitude in a multidisciplinary team.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1	**Engineering knowledge**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and

		safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**:	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**:	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1	Evolve AI based efficient domain specific processes for effective decision making in several domains such as business and governance domains.
PSO2	Arrive at actionable Foresight, Insight, hindsight from data for solving business and engineering problems.

MAPPING OF COURSE OUTCOME AND PROGRAM OUTCOME

Year	Sem	Course Name	PO												PSO	
			1	2	3	4	5	6	7	8	9	10	11	12	1	2
I	I	23HST101 - Professional English	1	1	1.5	2	1	-	-	-	1.8	3	1.5	2	-	-
		23MAT101 - Matrices and calculus	3	3	2	-	-	-	-	-	-	-	-	2	-	-
		23HST102 - தமிழர்மரபு/ Heritage of Tamils	-	-	-	-	-	-	-	2	1	2	-	1	-	-
		23PHE102 - Applied Physics for Computer Engineering	3	3	1	1	-	-	-	-	-	-	-	-	-	-
		23CYE101 - Engineering Chemistry	2.3	2.2	2.5	1.6	1.7	1.8	1.8	1.4	1.5	1.4	1.3	1.3	-	-
		23GEE101 - Programming in C	3.0	2.8	2.6	2.4	2.8	2.0	1.0	1.3	1.2	1.17	2.0	2.3	3.0	2.8
		23EEC101 - Soft Skills & Life Skills	1.25	1.6	1	1	3	1.4	1.4	2	2.6	2.8	2.6	2	-	-
		23MDC101 - Induction Program (2 Weeks)	-	-	-	-	-	-	-	-	-	-		-	-	-
	II	23MAT203 - Mathematical Foundations of Computing	3	2.4	2	1.4	2	-	-	-	-	-	-	2	-	-
		23PHT202 - Advanced Physics for Computer Engineering	-	-	-	-	-	1.40	2.20	1.25	1.80	3.00	-	3.00	-	-
		23CYT201 - Environmental Science and Sustainability	2	1.4	3	2	2.8	3	3	3	2	2.7	2.4	2.2	-	-
		23HST202-தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	-	-	-	-	-	-	-	2	1	-	-	1	-	-
		23HSE201-English for Engineers: Theory and Practice	1	2	-	2	1	2	2	1.5	2.3	3	2	1.6	-	-
		23EEE202 - Basic Electrical And Electronics Engineering	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-
		23CSE201 -PC Hardware Services and Networking	3.0	2.8	2.17	2.4	2.8	1.6	1.33	1.5	1.6	1.5	2.0	2.5	3.0	2.8
		23GEL201 - Engineering Practices Laboratory	3	2	-	-	1	1	1	-	-	-	-	2	2	1
		23EEC201 – Indian Language (Except Mother Tongue) / Foreign Language														
		Hindi	-	-	-	-	-	1.0	1.3	1.6	2.8		-	1.6	-	-
		German	-	-	-	-	-	1	1.5	1.7	3		-	1.6	-	-
		Japanese	-	-	-	-	1.4	1.6	1.6	1	0.2	2.6	-	1	-	-
		23MDC201 – Aptitude Skills	-	-	-	-	-	-	-	-	-		-	-	-	-
II	III	23MAT303 - Discrete Mathematics	3	3	2	1	-	-	-	-	-	1	-	-	-	-
		23ECT302- Digital Principles and Computer Architecture	3	2	2	2	2	2	-	-	-	-	2	2	3	3

		23ADT302 - Programming Using Java	2	1	2	2	2	-	-	-	2	2	1	1	3	2
		23GEE301-Problem Solving and Python Programming	3.0	3.0	3.0	2.3	2.8	1.0	1.0	1.3	1.5	1.3	2.0	2.5	3.0	3.0
		23ADE301 - Foundations of Artificial Intelligence	2	3	3	3	2	-	-	-	-	-	2	2	3	3
		23ADE302 - Data Structures Design	3	2	2	3	2	2	-	-	-	-	2	2	3	3
		23EEC301 - Professional Development	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	IV	23ADT401 - Advanced Networking and Protocols	2	2	2	2	2	-	-	-	2	2	2	2	2	2
		23ITT401 - Object Oriented Software Design	2.5	1.6	1.8	2	1	-	-	-	2	1.5	1.8	1.8	1.6	1.6
		23CST302-Operating Systems	3.0	2.6	2.2	1.7	2.8	1.0	1.0	1.0	1.0	1.2	–	2.6	3.0	2.8
		23ADE401 - Data Science and Analytics	1	1	2	2	2	-	-	-	2	2	2	2	2	2
		23ADE402 - Machine Learning Essentials	2	2	3	2	2	-	-	-	2	2	2	2	2	2
		23CSE402-Database Management Systems	3.0	3.0	2.8	2.6	3.0	1.2	1.0	1.6	1.8	1.3	1.5	2.6	3.0	3.0
		23EEC401 - Online Certification Courses	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023-2024 onwards)

B.Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - FIRST SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23HST101	Professional English	HS	3	0	0	3	40	60	100
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23HST102	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23PHE102	Applied Physics for Computer Engineering	BS	3	0	2	4	50	50	100
23CYE101	Engineering Chemistry	BS	3	0	2	4	50	50	100
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC101	Soft Skills & Life Skills	EEC	1	0	0	1	100	-	100
MANDATORY COURSE									
23MDC101	Induction Program (2 Weeks)	MC	-	-	-	-	-	-	-
TOTAL CREDITS IN SEMESTER - I			21						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
GE : General Elective
OE : Open Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE –SECOND SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23MAT203	Mathematical Foundations of Computing	BS	3	1	0	4	40	60	100
23PHT202	Advanced Physics for Computer Engineering	BS	3	0	0	3	40	60	100
23CYT201	Environmental Science and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HS	1	0	0	1	40	60	100
EMBEDDED COURSE									
23HSE201	English for Engineers: Theory and Practice	HS	3	0	2	4	50	50	100
23EEE202	Basic Electrical and Electronics Engineering	ES	3	0	2	4	50	50	100
23CSE201	PC Hardware Services and Networking	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC201	Indian Language (Except Mother Tongue) /Foreign Language	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
23MDC201	Aptitude Skills	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - II			25						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
GE : General Elective
OE : Open Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - THIRD SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23MAT303	Discrete Mathematics	BS	3	1	0	4	40	60	100
23ECT302	Digital Principles and Computer Architecture	ES	3	0	0	3	40	60	100
23ADT302	Programming Using Java	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100
23ADE301	Foundations of Artificial Intelligence	PC	3	0	2	4	50	50	100
23ADE302	Data Structures Design	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
TOTAL CREDITS IN SEMESTER - III			23						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - FOURTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23ADT401	Advanced Networking and Protocol	PC	3	0	0	3	40	60	100
23ITT401	Object Oriented Software Design	PC	3	0	0	3	40	60	100
23CST301	Operating Systems	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADE401	Data Science and Analytics	PC	3	0	2	4	50	50	100
23ADE402	Machine Learning Essentials	PC	3	0	2	4	50	50	100
23CSE402	Database Management Systems	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
TOTAL CREDITS IN SEMESTER - IV			24						

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total

B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - FIFTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23ADT501	UI and UX Design	PC	3	0	0	3	40	60	100
	Professional Elective I	PE	3	0	0	3	40	60	100
	Professional Elective II	PE	3	0	0	3	40	60	100
	Professional Elective III	PE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADE501	Deep Learning	PC	3	0	2	4	50	50	100
23ADE502	IOT and its Applications	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEC501	Industrial Training	EEC	0	0	4	2	100	-	100
MANDATORY COURSE									
	Mandatory Course – I	MC	3	0	0	0	-	-	-
TOTAL CREDITS IN SEMESTER - V			22						

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total

B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - SIXTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23ADT601	Business Intelligence	PC	3	0	0	3	40	60	100
	Professional Elective IV	PE	3	0	0	3	40	60	100
	Professional Elective V	PE	3	0	0	3	40	60	100
	Professional Elective VI	PE	3	0	0	3	40	60	100
	Open Elective - I / NCC I L1 / L3	OE	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADE601	Natural Language Processing	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ601	Project Work - Phase I	EEC	0	0	8	4	60	40	100
MANDATORY COURSE									
	Mandatory Course – II	MC	3	0	0	0	-	-	-
	TOTAL CREDITS IN SEMESTER - VI		23						

HS	:	Humanities and Social Sciences
BS	:	Basic Sciences
ES	:	Engineering Sciences
PC	:	Professional Core
PE	:	Professional Elective
OE	:	Open Elective
GE	:	General Elective
EEC	:	Employability Enhancement Courses
MC	:	Mandatory Courses
L	:	Lecture
T	:	Tutorial
P	:	Practical
C	:	Credit Point
CIA	:	Continuous Internal Assessment
ESE	:	End Semester Examination
TOT	:	Total

B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - SEVENTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23HST701	Human Values and Ethics	HS	3	0	0	3	40	60	100
	Elective-Management	GE	3	0	0	3	40	60	100
	Open Elective - II / NCC II L2 / L4	OE	3	0	0	3	40	60	100
	Open Elective – III	OE	3	0	0	3	40	60	100
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ701	Project Work - Phase II	EEC	0	0	8	4	60	40	100
	TOTAL CREDITS IN SEMESTER - VII					16			

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

B. Tech. - ARTIFICIAL INTELLIGENCE AND DATA SCIENCE - EIGHTH SEMESTER

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
EMPLOYABILITY ENHANCEMENT COURSE									
23EEJ801	Product Development	EEC	0	0	12	6	60	40	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100
TOTAL CREDITS IN SEMESTER - VIII			8						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

LIST OF HUMANITIES AND SOCIAL SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23HST101	Professional English	HS	3	0	0	3	40	60	100
23HST102	தமிழர்மரபு/Heritage of Tamils	HS	1	0	0	1	40	60	100
23HSE201	English for Engineers: Theory and Practice	HS	3	0	2	4	50	50	100
23CYT201	Environmental Science and Sustainability	HS	3	0	0	3	40	60	100
23HST202	தமிழரும்தொழில்நுட்பமும் / Tamils and Technology	HS	1	0	0	1	100	-	100
23HST701	Human Values and Ethics	HS	3	0	0	3	40	60	100

LIST OF BASIC SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MAT101	Matrices and Calculus	BS	3	1	0	4	40	60	100
23PHE102	Applied Physics for Computer Engineering	BS	3	0	2	4	50	50	100
23CYE101	Engineering Chemistry	BS	3	0	2	4	50	50	100
23MAT203	Mathematical Foundations of Computing	BS	3	1	0	4	40	60	100
23PHT202	Advanced Physics for Computer Engineering	BS	3	0	0	3	40	60	100
23MAT301	Discrete Mathematics	BS	3	1	0	4	40	60	100

LIST OF ENGINEERING SCIENCES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23GEE101	Programming in C	ES	3	0	2	4	50	50	100
23EEE202	Basic Electrical and Electronics Engineering	ES	3	0	2	4	50	50	100
23GEE301	Problem Solving and Python Programming	ES	3	0	2	4	50	50	100
23ECT302	Digital Principles and Computer Architecture	PC	3	1	0	4	40	60	100

LIST OF PROFESSIONAL CORE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CSE201	PC Hardware Services and Networking	PC	3	0	2	4	50	50	100
23CSE301	Object Oriented Programming	PC	3	0	2	4	50	50	100
23CSE302	Data Structures and Algorithms	PC	3	0	2	4	50	50	100
23CST301	Operating Systems	PC	3	0	0	3	40	60	100
23CST401	Distributed Computing	PC	3	0	0	3	40	60	100
23CST402	Automata Theory	PC	3	1	0	4	40	60	100
23CSE401	Artificial Intelligence and Machine Learning	PC	3	0	2	4	50	50	100
23CSE402	Database Management Systems	PC	3	0	2	4	50	50	100
23ITE501	Full Stack Web Development	PC	3	0	2	4	50	50	100
23CST501	Cryptography and Network Security	PC	3	1	0	4	40	60	100
23CSE501	Computer Networks	PC	3	0	2	4	50	50	100
23CSE502	Object Oriented Software Engineering	PC	3	0	2	4	50	50	100
23CSE601	Cloud Computing	PC	3	0	2	4	50	50	100
23ITE601	Mobile Computing	PC	3	0	2	4	50	50	100

LIST OF PROFESSIONAL ELECTIVE COURSES

PROFESSIONAL ELECTIVE - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23ADP501	Mobile Applications and its Development	PE	3	0	0	3	40	60	100
23ADP502	Knowledge Engineering	PE	3	0	0	3	40	60	100
23CSP503	Recommender Systems	PE	3	0	0	3	40	60	100
23CSP504	Text and Speech Analysis	PE	3	0	0	3	40	60	100
23ITP501	Image and Video Analytics	PE	3	0	0	3	40	60	100
23CSP608	Soft Computing	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23ADP503	Cloud Technologies	PE	3	0	0	3	40	60	100
23ADP504	App Development	PE	3	0	0	3	40	60	100
23CSP511	Web Application Security	PE	3	0	0	3	40	60	100
23CSP508	Cloud Services Management	PE	3	0	0	3	40	60	100
23CSP510	Software Testing and Automation	PE	3	0	0	3	40	60	100
23CSP506	Big Data Analytics	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - III

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CSP516	Security and Privacy in Cloud	PE	3	0	0	3	40	60	100
23CSP502	Exploratory Data Analysis	PE	3	0	0	3	40	60	100
23ADP508	Data Warehousing	PE	3	0	0	3	40	60	100

23ITP505	Storage Technologies	PE	3	0	0	3	40	60	100
23CSP514	Software Defined Networks	PE	3	0	0	3	40	60	100
23CSP515	Stream Processing	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - IV

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23ADP601	Network Security	PE	3	0	0	3	40	60	100
23CSP601	Hacking Techniques	PE	3	0	0	3	40	60	100
23ITP601	Digital Forensics	PE	3	0	0	3	40	60	100
23CSP602	Social Network Security	PE	3	0	0	3	40	60	100
23CSP603	Engineering Secure Software Systems	PE	3	0	0	3	40	60	100
23ITP504	Human Computer Interaction	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE -V

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23CSP604	Augmented Reality / Virtual Reality	PE	3	0	0	3	40	60	100
23ITP603	Game Development	PE	3	0	0	3	40	60	100
23ADP602	Neural Networks and Deep Learning	PE	3	0	0	3	40	60	100
23ADP603	Agile Methodology	PE	3	0	0	3	40	60	100
23CCP602	Cyber Physical System Security	PE	3	0	0	3	40	60	100
23CSP609	Cognitive Science	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVE - VI

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23ADP604	Ethics of Artificial Intelligence	PE	3	0	0	3	40	60	100
23CSP607	Quantum Computing	PE	3	0	0	3	40	60	100
23CCP603	Cryptocurrency and Blockchain Technologies	PE	3	0	0	3	40	60	100
23CSP610	Optimization Techniques	PE	3	0	0	3	40	60	100
23ITP604	Information Assurance and Security	PE	3	0	0	3	40	60	100
23CST401	Distributed Computing	PE	3	0	0	3	40	60	100

LIST OF OPEN ELECTIVE COURSES

OPEN ELECTIVE - I

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
CIVIL	23CEO607 / Environmental and Social Impact Assessment	OE	3	0	0	3	40	60	100
CSE	23CSO610 / Introduction to Drone Technologies	OE	3	0	0	3	40	60	100
ECE	23ECO602 / Fundamentals of Electronic Devices and Circuits	OE	3	0	0	3	40	60	100
EEE	23EEO603 / Electric Vehicle Technology	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO601 / Introduction to Industrial Engineering	OE	3	0	0	3	40	60	100
	23MEO605 / CNC MACHINING TECHNOLOGY	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO611 / Hospital Management	OE	3	0	0	3	40	60	100
ROBOTICS AND AUTOMATION	23RAO609 / Fundamentals of Robotics	OE	3	0	0	3	40	60	100
CSE (Cyber Security)	23CSO612 / Cyber Forensics and Ethical Hacking	OE	3	0	0	3	40	60	100
PHARMACEUTICAL TECHNOLOGY	23PMO608 / Pharamaceutical Nanotechnology	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO606 / Graph Theory	OE	3	0	0	3	40	60	100

OPEN ELECTIVE- II

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
CIVIL	23CEO704 / Remote Sensing Concepts	OE	3	0	0	3	40	60	100
ECE	23ECO708 / Energy Technology	OE	3	0	0	3	40	60	100
EEE	23EEO709 / Sensors, Actuators and its Application	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO703 / Fundamentals of Mechatronics	OE	3	0	0	3	40	60	100
	23MEO704 / Nano Technology	OE	3	0	0	3	40	60	100
	23MEO712 / Smart Manufacturing	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO705 / Ultrasound Principles and its Medical Applications	OE	3	0	0	3	40	60	100
ROBOTICS AND AUTOMATION	23RAO707 / Mobile Robots	OE	3	0	0	3	40	60	100
CSE(Cyber Security)	23CSO711 / Introduction to Cyber Security	OE	3	0	0	3	40	60	100
PHARMACEUTICAL TECHNOLOGY	23PMO706 / Intellectual Property Rights for Pharma Industry	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO710 / Operations Research	OE	3	0	0	3	40	60	100

OPEN ELECTIVE – III

Offered by the Departments	Course Code / Course Name	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
CIVIL	23CEO717 / Geographical Information System	OE	3	0	0	3	40	60	100
CSE	23CSO715 / Fundamentals of Blockchain Technology	OE	3	0	0	3	40	60	100
ECE	23ECO718 / VLSI Design	OE	3	0	0	3	40	60	100
EEE	23EEO716 / Electrical,Electronic and Magnetic Materials	OE	3	0	0	3	40	60	100
MECHANICAL	23MEO720 / Marine Vehicles	OE	3	0	0	3	40	60	100
MEDICAL ELECTRONICS	23MDO719 / Wearable Technology	OE	3	0	0	3	40	60	100
	23MDO723 / Medical Waste Management								
	23MDO724 / Lifestyle Diseases								
ROBOTICS AND AUTOMATION	23RAO721 / Robotics Process Automation	OE	3	0	0	3	40	60	100
MATHEMATICS	23MAO714 / Advanced Numerical Methods	OE	3	0	0	3	40	60	100
MANAGEMENT	23MGO722 / Cost management of Engineering Projects	OE	3	0	0	3	40	60	100

GENERAL ELECTIVES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23NCCL01	NCC AIRFORCE LEVEL 1	GE	3	0	0	3	40	60	100
23NCCL02	NCC AIRFORCE LEVEL – 2	GE	3	0	0	3	40	60	100
23NCCL03	NCC ARMY LEVEL – 3	GE	3	0	0	3	40	60	100
23NCCL04	NCC ARMY LEVEL – 4	GE	3	0	0	3	40	60	100

ELECTIVE - MANAGEMENT

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MGT701	Principles of Management	GE	3	0	0	3	40	60	100
23MGT702	Total Quality Management	GE	3	0	0	3	40	60	100
23MGT703	Engineering Economics and Financial Accounting	GE	3	0	0	3	40	60	100
23MGT704	Human Resource Management	GE	3	0	0	3	40	60	100
23MGT705	Knowledge Management	GE	3	0	0	3	40	60	100
23MGT706	Industrial Management	GE	3	0	0	3	40	60	100
23MGT707	Supply Chain Management	GE	3	0	0	3	40	60	100
23MGT708	e-Waste Management	GE	3	0	0	3	40	60	100

LIST OF EMPLOYABILITY ENHANCEMENT COURSES

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23EEC101	Soft Skills & Life Skills	EEC	1	0	0	1	100	-	100
23EEC201	Indian Language (Except Mother Tongue) / Foreign Language	EEC	0	0	4	2	100	-	100
23EEC301	Professional Development	EEC	0	0	2	1	100	-	100
23EEC401	Online Certification Courses	EEC	3	0	0	3	100	-	100
23EEC501	Industrial Training	EEC	0	0	4	2	100	-	100
23EEJ601	Project Work - Phase I	EEC	0	0	8	4	60	40	100
23EEJ701	Project Work - Phase II	EEC	0	0	8	4	60	40	100
23EEJ801	Product Development	EEC	0	0	12	6	60	40	100
23EEC801	Internship	EEC	0	0	4	2	100	-	100

LIST OF MANDATORY COURSES

MANDATORY COURSES - I

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MDC501	Introduction to Women and Gender Studies	MC	3	0	0	0	-	-	-
23MDC502	Elements of Literature	MC	3	0	0	0	-	-	-
23MDC503	Film Appreciation	MC	3	0	0	0	-	-	-
23MDC504	Disaster Risk Reduction and Management	MC	3	0	0	0	-	-	-
23MDC505	Constitution of India	MC	3	0	0	0	-	-	-

MANDATORY COURSES - II

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
23MDC601	Well Being with Traditional Practices- Yoga, Ayurveda and Siddha	MC	3	0	0	0	-	-	-
23MDC602	History of Science and Technology in India	MC	3	0	0	0	-	-	-
23MDC603	Political and Economical Thought for a Human Society	MC	3	0	0	0	-	-	-
23MDC604	State, Nation Building and Politics in India	MC	3	0	0	0	-	-	-
23MDC605	Industrial Safety	MC	3	0	0	0	-	-	-

CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(For the Students Admitted in the Academic Year 2023-2024 onwards)

CREDIT SUMMARY

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Category	Credits Per Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
HS	4	4	-	-	-	-	3	-	11
BS	12	7	8	-	-	-	-	-	27
ES	4	10	-	-	-	-	-	-	14
GE	-	-	-	-	-	-	3	-	3
PC	-	4	14	21	11	7	-	-	59
PE	-	-	-	-	9	9	-	-	18
OE	-	-	-	-	-	3	6	-	9
EEC	1	2	1	3	2	4	4	8	25
MC	-	-	-	-	-	-	-	-	-
Total	21	27	23	24	22	23	16	8	164

SEMESTER I

23HST101	PROFESSIONAL ENGLISH	L T P C
	(Common to all B.E. & B.Tech. Branches)	3 0 0 3

OBJECTIVES

- To build vocabulary proficiency and familiarity with varied lexical and contextual usages.
- To strengthen grammatical accuracy for effective sentence construction and language application.
- To develop clarity and coherence in written communication across academic and business contexts.
- To enhance oral fluency, confidence, and interactive communication skills.
- To promote efficient reading strategies for comprehension, analysis, and note-making.

UNIT I VOCABULARY 8

Synonyms and Antonyms - Word Formation - Sentence Types (declarative, imperative, interrogative & exclamatory) - Single Word Substitutes - Use of Abbreviations and Acronyms- Homonyms and Homophones - Collocation - British and American Vocabulary.

UNIT II GRAMMAR 10

Parts of speech - Be, Have and Do verbs - Punctuation - Tenses - Numerical Adjectives - modal verbs - Single line Definition - Direct and Indirect Speech - Gerunds and Infinitives - Same Word Used as Different Parts of Speech.

UNIT III WRITING 9

Letter Writing - Business communications - quotations, placing orders, complaints, replies to queries from business customers - Dialogue Writing – Paragraph Writing (descriptive, narrative, expository & persuasive) - Essay Writing - Writing Instructions.

UNIT IV SPEAKING 9

Self-introduction - Giving personal and factual information - Talking about present circumstances, past experiences and future plans - Expressing opinions and justifying opinions - Agreement / disagreement - Likes and dislikes - Tongue twisters.

UNIT V READING SKILLS 9

Reading Comprehension – Reading techniques, pre-reading, post-reading, comprehension questions (multiple choice questions or short questions) - Short Comprehension Passages, practice skimming - Scanning and Predicting - Reading the passage and taking (Note making) Notes - Scan and understand main contents of the passage.

TOTAL: 45 PERIODS

Mandatory activity: Record Submission for English Speaking Hour with Faculty Members

OUTCOMES

Upon completion of the course, the students will be able to:

- Use a wide range of vocabulary effectively in oral and written communication.
- Frame grammatically and meaningful sentences.
- Write formal and informal letters, develop coherent paragraphs and essays, and engage in meaningful dialogues.
- Apply speaking skills for self-introduction, speeches, and technical presentations.
- Read, comprehend, and take organized notes from passages and technical conte.

TEXT BOOKS

1. "Using English A Course book for Under graduate Engineers and Technologists", . Orient Black Swan Limited, Hyderabad, Board of Editors: 2015.
2. Richards, C. Jack ,"Interchange Students' Book-2",2015.

REFERENCES

1. Department of English, Anna University, "Mindscapes: English for Technologists and Engineers", First Edition, Orient Black Swan,2012.
2. Krishna Mohan, Meera Banerji, "Developing Communication Skills", Paperback, MacMillan, 2019.

E-RESOURCES

1. http://www.usingenglish.com
2. https://www.khanacademy.org/humanities/grammar

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	-	-	-	1	-	-	-	2	3	-	2	-	-
2	1	-	-	-	1	-	-	-	2	3	-	2	-	-
3	-	1	2	-	1	-	-	-	2	3	1	2	-	-
4	-	-	1	-	-	-	-	-	2	3	2	2	-	-
5	1	1	-	2	1	-	-	-	1	3	-	2	-	-
AVG	1	1	1.5	2	1	-	-	-	1.8	3	1.5	2	-	-

1- Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23MAT101 **MATRICES AND CALCULUS** L T P C

(Common to all B.E./ B.Tech. Branches) 3 1 0 4

OBJECTIVES

- To develop the use of matrix algebra and its properties.
- To explore the techniques of differential and integral calculus.
- To categorize methods for functions of several variables.
- To introduce the use of multiple integrals and their applications.
- To provide knowledge of vector calculus.

UNIT I MATRICES 9+3

Eigen values and Eigen vectors – Properties of Eigen values – Cayley-Hamilton theorem – Reduction of quadratic form to canonical form by orthogonal transformation – Nature of quadratic form.

UNIT II DIFFERENTIAL AND INTEGRAL CALCULUS 9+3

Differentiation rules: Derivatives of polynomials and exponential functions – The product and quotient Rules – Derivatives of trigonometric functions – The Chain rule – Implicit differentiation – Applications of differentiation: Maximum and Minimum Values – Techniques of integration: Integration by parts – Trigonometric integrals – Integration of rational functions by partial fractions.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9+3

Partial derivatives – Homogeneous functions – Euler's theorem – Total derivative – Jacobians –Taylor's theorem for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV MULTIPLE INTEGRALS 9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double integrals.

UNIT V VECTOR CALCULUS 9+3

Scalar and vector point functions – Gradient – Divergence and curl – Line integral – Surface integral – Green's theorem in a plane – Volume integral – Divergence theorem – Irrotational and Solenoidal fields.

OUTCOMES

Upon completion of the course, Students will be able to:

- Apply matrix algebra methods to solve practical problems.
- Apply the concepts of differential and integral calculus.
- Analyze the ideas of differential calculus for functions of several variables.
- Apply multiple integral ideas in solving areas and volumes.
- Solve the engineering problems using the concepts of vector calculus.

LIST OF EXPERIMENTS

1. Computation of Eigen values and Eigenvectors.
2. Matrix addition and multiplications.
3. Calculate differentiations of simple functions.
4. Calculate integrations of simple functions.
5. Determining Maxima and minima of functions for one variable.
6. Determining Maxima and minima of functions for two variables.
7. Evaluating double integral with constant limits.
8. Evaluating triple integral with constant limits.
9. Computing Gradient, divergence and curl of point functions.
10. Evaluating line integral in vector calculus.

TOTAL: 45+15 PERIODS

TEXT BOOKS

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Fourty Third Edition, New Delhi, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, Seventh Edition, New Delhi, 2015.

REFERENCES

1. Bali N.P, Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, Seventh Edition, 2009.
2. Kanti B. Dutta., "Mathematical Methods of Science and Engineering – Aided with MATLAB", Cengage Learning, New Delhi, Second Edition, 2013.

E-RESOURCES

1. https://nptel.ac.in/courses/111105121 (Differential Calculus and Integral Calculus)
2. https://nptel.ac.in/courses/111107112 (matrix analysis)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	-	-	-	-	-	-	-	-	2	-	-
2	3	3	2	-	-	-	-	-	-	-	-	2	-	-
3	3	3	2	-	-	-	-	-	-	-	-	2	-	-
4	3	3	2	-	-	-	-	-	-	-	-	2	-	-
5	3	3	2	-	-	-	-	-	-	-	-	2	-	-
AVG	3	3	2	-	-	-	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23HST102	HERITAGE OF TAMILS	L	T	P	C
	(Common to all Branches)	1	0	0	1

OBJECTIVES

- To familiarize the students on extensive literature of classical Tamil.
- To analyze rock art paintings to modern art.
- To acquire knowledge on folk and martial arts.
- To apply the concepts of Thinai in Tamils.
- To realize the contribution of Tamils in Indian freedom struggle.

UNIT I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars – Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils..

UNIT III FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, VilluPattu, KaniyanKoothu,Oyillattam,Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils

UNIT IV THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils &Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL: 15 PERIODS

OUTCOMES

Upon the completion of the course, the students will be able to:

- Analyze the extensive literature Tamil and classical nature.
- Understand the heritage of sculpture, painting and musical instruments.

- Classify the folk and martial arts of Tamil people.
- Examine Thinai concepts, trade and victory of Chozha dynasty.
- Interpret the contribution of Tamils in Indian freedom struggle, Self-esteem movement and siddha medicine.

TEXT BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியிடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	2	1	2	-	1	-	-
2	-	-	-	-	-	-	-	2	1	2	-	1	-	-
3	-	-	-	-	-	-	-	2	1	2	-	1	-	-
4	-	-	-	-	-	-	-	2	1	2	-	1	-	-
5	-	-	-	-	-	-	-	2	1	2	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	2	-	1	-	-

1 - Low 2 - Medium 3 - High '-'- No Correlation

Chairman - BoS

23HST102

தமிழர்மரபு

(அனைத்து துறைகளுக்கும் பொதுவானது)

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நோக்கங்கள்

மாணவர்கள் கண்டிப்பாக அறிய வேண்டுவன

- செம்மொழியான தமிழ்மொழியின் விரிவான இலக்கியத்தைப்பற்றி அறிதல்.
- பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை உள்ள கலைகளை பகுப்பாய்வு செய்தல்.
- நாட்டுப்புறக்கலைகள் மற்றும் வீர விளையாட்டுகளைப்புரிந்துகொள்ளுதல்.
- தமிழர்களின் திணைக்கோட்பாடுகளைச்செயல்படுத்துதல்.
- இந்திய விடுதலைப்போராட்டத்திற்கும் பண்பாட்டிற்கும் தமிழர்களின் பங்களிப்பை உணருதல்.

அலகு I மொழி மற்றும் இலக்கியம் 3

இந்திய மொழிக் குடும்பங்கள்– திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி– தமிழ் செவ்விலக்கியங்கள்– சங்க இலக்கியத்தின் சமய சார்பற்ற தன்மை–சங்க இலக்கியத்தில் பகிர்தல் அறம்–திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க்காப்பியங்கள், தமிழத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வாழ்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள்வரை – சிற்பக்கலை 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினை பொருட்கள் ,பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள்– குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள்– மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புற கலைகள் மற்றும் வீரவிளையாட்டுகள் 3

தெருக்குத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஒயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி ,புலியட்டம், தமிழர்களின் விளையாட்டுகள்

அலகு IV தமிழர்களின் திணைக்கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும் விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் – தமிழர்கள் போற்றிய அருட்கோட்பாடு – சங்ககாலத்தில் தமிழ்கத்தில் எழுத்தறிவும் கல்வியும்–சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாற்றிக்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியாவின் பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுய மரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின்

பங்கு – கல்வெட்டுகள் ,கையழுத்துப்படிகள் – தமிழ்ப்புத்தகங்களின் அச்சு வரலாறு.

TOTAL: 15 PERIODS

முடிவுகள்

பாடத்தின்முடிவில், மாணவர்கள் அறிந்து கொள்வன:

- தமிழ்மொழியின்செம்மொழிதன்மையையும்சங்கஇலக்கியத்தின்முக்கியத்துவத்தையும்உணர்வார்கள்.
- தமிழர்களின்சிற்ப, ஓவிய, இசை மரபுகளை புரிந்து கொள்வார்கள்.
- நாட்டுப்புறக் கலைகளையும் வீர விளையாட்டுகளையும் வகைப்படுத்துவார்கள்.
- தமிழர்களின்திணைக்கோட்பாடுகளும்சங்ககாலவர்த்தகமும்புரிந்துகொள்வார்கள்.
- இந்திய விடுதலைப் போராட்டம், சுயமரியாதை இயக்கம், சித்த மருத்துவம் ஆகியவற்றில் தமிழர்களின் பங்களிப்பை விளக்குவார்கள்.

உரைமற்றும்குறிப்புபுத்தகங்கள்

1. தமிழக வரலாறு –மக்களும் பண்பாடும் – கே. கே. பிள்ளை (வெளியிடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் –முனைவர் இல. சுந்தரம். (விகடன்பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை–ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	2	1	2	-	1	-	-
2	-	-	-	-	-	-	-	2	1	2	-	1	-	-
3	-	-	-	-	-	-	-	2	1	2	-	1	-	-
4	-	-	-	-	-	-	-	2	1	2	-	1	-	-
5	-	-	-	-	-	-	-	2	1	2	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	2	-	1	-	-

1 - Low 2 - Medium 3 - High '-' - No Correlation

Chairman - BoS

23PHT102 **APPLIED PHYSICS FOR COMPUTER ENGINEERING** L T P C

(Common to CSE, CSE-SC, IT, AI&DS and AI&ML) 3 0 0 3

OBJECTIVES

- To introduce the fundamental principles of lasers and their general scientific and engineering applications.
- To explain the fundamentals of quantum mechanics and Schrödinger's wave equation for understanding complex physical phenomena.
- To impart knowledge of the basic concepts of integrated circuits (ICs) and digital electronic components.
- To provide an understanding of the principles and operation of magnetic and optical storage devices.
- To familiarize students with the fundamentals of nanomaterials and their various synthesis methods.

UNIT I PHOTONICS 9

Spontaneous and Stimulated Emission- Population Inversion - Derivation of Einstein's A and B coefficients – Principle and working of He Ne Laser - Direct bandgap and Indirect Bandgap Semiconductors - Semiconductor Diode Laser (Homojunction & heterojunction) - Applications of Lasers in Science, Engineering and Medicine – Working principle of Laser printer.

UNIT II QUANTUM PHYSICS 9

Black Body Radiation – Planck's theory (derivation) – Electron Diffraction – Wave function and its Physical significance – Schrödinger's wave equations: Time Independent and Time Dependent Equation - Scanning Electron Microscope - Transmission Electron Microscope - Quantum Tunneling & Scanning Tunneling Electron Microscope.

UNIT III FUNDAMENTALS OF DIGITAL ELECTRONICS AND LOGIC DESIGN 9

INTEGRATED ELECTRONICS: Introduction of ICs - Steps in Fabrication of Monolithic IC's – General applications of IC's.

DIGITAL ELECTRONICS AND LOGIC DESIGN : Number System and Representation - Programs - Boolean Algebra and Logic Gates – Demorgan's Theorem - Combinational Logic Circuits - Flip-Flops and Sequential Circuits.

UNIT IV DATA STORAGE MATERIALS 9

PRIMARY STORAGE: Random Access Memory (RAM)– Static RAM – Dynamic RAM – Read only Memory (ROM) - **SECONDARY STORAGE** : Magnetic Disc Memories –Hard Disk Drive and Solid State Drive - **TERTIARY STORAGE** : Optical Data Storage Devices: Principle-Disc data storage- Structure and Operating Principle of DVD & Blu-ray Disc - **OFF-LINE STORAGE** : USB Flash drive – Memory card – **FUTURE STORAGE DEVICES (Concept only)** : Holographic data storage - DNA digital data storage - Helium Drives.

UNIT V INTRODUCTION TO NANO SCIENCE & NANOELECTRONICS 9

NANO SCIENCE: Emergence of Nanoscience - Role of Particle Size - quantum structures: Quantum Well, Quantum Wire And Quantum Dot- Properties at Nano scale (optical, electronic and magnetic) - Synthesis of Nanomaterials: Physical Vapour Deposition (PVD) - Pulsed Laser Deposition (PLD).

NANO-ELECTRONICS: Single electron transistors, Spintronics - Nanotechnology in Computer Science.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, students will be able to :

- Explain the fundamental principles of lasers and their applications.
- Analyze the principles of quantum mechanics and Schrödinger's wave equation to identify complex physical phenomena.
- Apply the concept of digital electronics to design various logic gates.
- Analyze the working principles of different storage media and storage devices.
- Analyze the properties of nanomaterial's and various synthesis methods.

TEXT BOOKS

1. K.G.Aswani, "A Text book of Material Science", S. Chand & Company Ltd, (2001).
2. M.Arumugam, "Semiconductor Physics and Optoelectronics", Anuradha Agencies, 2019.
3. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2019

REFERENCES

1. Avadhanulu M.N & Kshirsagar P.G "Text Book of Engineering Physics". S.Chand, 2016
2. Hanson G.W. "Fundamentals of Nanoelectronics". Pearson Education, 2019
3. C.N.R. Rao, P.J. Thomas and G.U. Kulkarni, "Nanocrystals: Synthesis, Properties and Applications", Springer (2017)

E-RESOURSES

1. https://archive.nptel.ac.in/courses/122/107/122107035/
2. https://nptel.ac.in/courses/118102003

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	1	1	-	-	-	-	-	-	-	-	-	-
2	3	3	1	1	-	-	-	-	-	-	-	-	-	-
3	3	3	1	1	-	-	-	-	-	-	-	-	-	-
4	3	3	1	1	-	-	-	-	-	-	-	-	-	-
5	3	3	1	1	-	-	-	-	-	-	-	-	-	-
6	3	3	1	1	-	-	-	-	-	-	-	-	-	-
AVG	3	3	1	1	-	-	-	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23CYT101 **ENGINEERING CHEMISTRY** **L T P C**

(Common to CSE, EEE, ECE, CSE (CS), MDE, AIDS, IT, PT& CSE(AIML)) **3 0 0 3**

OBJECTIVES

- To introduce the characteristics of water and water treatment methods for industrial applications.
- To familiarize students with the types, properties, and applications of polymers and related materials.
- To employ the principles of phase rule, alloy formation, and heat treatment methods.
- To discuss the synthesis, characterization, and applications of nanomaterials.
- To apply electrochemical principles to understand corrosion mechanisms and corrosion control methods.

UNIT I WATER TECHNOLOGY **9**

Introduction - Characteristics – Hardness – Estimation of hardness by EDTA method – Alkalinity and its estimation - Boiler feed water – Requirements –Boiler troubles (Scale and Sludge) – Internal conditioning (phosphate, calgon and carbonate conditioning methods) – External conditioning – Zeolite process, Demineralization process – Desalination of brackish water by reverse osmosis.

UNIT II POLYMER CHEMISTRY **9**

Introduction - Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting plastic. Functionality – Degree of polymerization. Types of polymerization: Addition Condensation and Copolymerization, Property of polymer: Glass transition temperature,Preparation, properties and uses of PVC, Nylon 6,6, Polyethylene - Rubbers – Types – Vulcanization of rubber – Plastics – Moulding constituents of plastics – Moulding of plastics – Compression and injection - Biodegradable polymers- Conducting polymers.

UNIT III PHASE RULE AND ALLOYS **9**

Phase rule - Explanation of terms involved – One component system – Water system – Condensed phase rule- Simple eutectic systems (Lead – Silver system only). Alloys: Introduction – Definition- Properties of alloys- Significance of alloying, functions and effect of alloying elements - Ferrous alloys – Nichrome and stainless steel – Heat treatment of steel, non-ferrous alloy – Brass.

UNIT IV CHEMISTRY OF NANO MATERIALS **9**

Nano chemistry – Basics (Surface area to volume ratio - Distinction between molecules, nanoparticles and bulk materials- Characterization of nanomaterials using EDX and HR-TEM. Synthesis of nano materials: Top down approach - Ball milling - Bottom up approach - Sol-gel method, Chemical vapour deposition - Applications of nanomaterials (Nano products of today).

UNIT V ELECTROCHEMISTRY, CORROSION AND ITS CONTROL **9**

Introduction- Electrochemical cells, applications of electrochemical series-Reference Electrode-standard calomel electrode, ion selective electrode, glass electrode, Corrosion – Types – Chemical Corrosion –

Electrochemical Corrosion (galvanic and differential aeration) - Factors influencing corrosion – Material selection and design aspects-Control methods of corrosion –sacrificial anodic and impressed current cathodic protection.

OUTCOMES

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

- Explain the quality parameters of water and identify appropriate methods for removing impurities for both domestic and industrial applications.
- Describe various types of polymers, their polymerization processes, and discuss their special properties and engineering applications.
- Apply the phase rule to understand alloy formation and its relevance in engineering applications.
- Discuss the fundamentals of nanomaterials and apply the core concepts of nanochemistry to engineering problems.
- Analyze the causes of corrosion and propose effective prevention and control strategies.

TOTAL:45 PERIODS

TEXT BOOKS

1. Jain P.C and Monika Jain, "Engineering Chemistry", SeventeenthEdition, DhanpetRai Publishing Company (P) Ltd. New Delhi, 2015.
2. Viswanathan B, "Nanomaterials" First Edition, Alpha Science International Ltd, 2009.

REFERENCES

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", Tenth Edition, S. Chand & Company Ltd, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Second Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.

E-RESOURCES

1. https://nptel.ac.in/courses/104105084
2. http://library.iitbbs.ac.in/open-access-e-resources.php

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1	3	-	1	-	-	3	-	-	-	-	-	-
2	1	2	2	2	1	1	1	-	2	1	2	1	-	-
3	3	3	3	2	2	2	2	1	1	2	1	1	-	-
4	2	2	2	1	2	2	2	1	-	1	1	1	-	-
5	3	2	3	2	3	2	2	1	2	1	-	2	-	-
6	3	3	2	1	1	2	2	1	1	2	-	-	-	-
AVG	2.3	2.2	2.5	1.6	1.7	1.8	1.8	1.4	1.5	1.4	1.3	1.3	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23GEE101	PROGRAMMING IN C	L T P C
	(Lab Embedded Theory Course)	3 0 2 4

OBJECTIVES

- To impart fundamental knowledge of C programming concepts, syntax, data types, operators, control structures, and program development.
- To develop students' understanding of arrays, strings, searching, and sorting techniques for solving computational problems.
- To train students in designing modular programs using functions, recursion, pointers, and parameter passing mechanisms.
- To familiarize students with structures, unions, dynamic memory allocation, and their applications in software development.
- To enable students to perform file handling operations and develop efficient C programs using sequential and random file processing.
- To develop C programs to solve real-world programming problems.

UNIT I BASICS OF C PROGRAMMING 9

Introduction to programming paradigms – Structure of C program – C programming: Data Types–variables–Storage classes – Constants – Enumeration Constants – Keywords – Operators: Precedence and Associativity – Expressions –Input/Output statements, Assignment statements – Decision making statements – Switch statement – Looping statements – Pre-processor directives – Compilation process.

Coding practices :

1. Develop a program to find the largest of three numbers using nested if statements.
2. Develop a program to generate multiplication tables using loops.

Problem - solving assignments :

1. Write a program to calculate the area and perimeter of a rectangle, circle, and triangle.
2. Write a program to calculate simple interest and compound interest.

UNIT II ARRAYS AND STRINGS 9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Example Program: Computing Mean, Median and Mode – Two dimensional arrays – Example Program: Matrix Operations (Addition, Scaling, Determinant and Transpose) – String operations: length, compare, concatenate, copy –Sorting – Selection sort, Insertion sort, Merge sort, quick sort –Searching – linear and binary search.

Coding practices :

1. Develop a program to perform matrix addition and transpose using two-dimensional arrays.
2. Write a program to sort an array using Insertion Sort.

Problem - solving assignments :

1. Develop a program to perform matrix operations such as addition and transpose using two-dimensional arrays.
2.

3. Write a program to search for an element in an array using Linear Search and Binary Search.

UNIT III FUNCTIONS AND POINTERS 9

Introduction to functions: Function prototype, function call, Built–in functions (string functions, math functions) – Recursion – Example Program: Computation of Sine series, Scientific calculator using built-in functions – Pointers – Pointer operators – Arrays and pointers – Example Program: Sorting of names – Parameter passing: Pass by value, Pass by reference – Example Program: Swapping of two numbers and changing the value of a variable using pass by reference.

Coding practices :

1. Develop a recursive program to generate the Fibonacci series.
2. Develop a program to implement a scientific calculator using built-in mathematical functions.

Problem - solving assignments :

1. Write a program to perform arithmetic operations using user-defined functions.
2. Write a program to swap two numbers using pass-by-value and pass-by-reference.

UNIT IV STRUCTURES AND UNION 9

Structure – Example Programs – Nested structures – Pointer in Structures – Array of structures Example Program using structures and pointers – Self referential structures – Dynamic memory allocation, Union- Storage classes.

Coding practices :

1. Develop a program to generate an employee salary slip using structures and pointers.
2. Develop a program using nested structures to represent student academic details.

Problem - solving assignments :

1. Write a program to store and display employee details using an array of structures.
2. Develop a program to demonstrate dynamic memory allocation using structures.

UNIT V FILE PROCESSING 9

Files – Operations of File – Types of file processing: Sequential access, Random access – Sequential access file – Random access file – Command line arguments.

Coding practices:

1. Write a program to create, write, and read a text file.
2. Develop a program to copy the contents of one file to another.

Problem - solving assignments :

1. Write a program to create, write, and read student records using sequential file processing.
2. Write a program to implement command-line arguments for performing arithmetic operations

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Programs using I/O statements, expressions and decision–making constructs.
2. Write a program to find whether the given year is leap year or Not.
3. Design a calculator to perform the operations, namely, addition, subtraction, multiplication, division and square of a number.
4. Check whether a given number is Armstrong number or not?
5. Given a set of numbers like <10, 36, 54, 89, 12, 27>, find sum of weights based on the following conditions.
   a) 5 if it is a perfect cube.
   b) 4 if it is a multiple of 4 and divisible by 6.
   c) 3 if it is a prime number.
6. Populate an array with height of persons and find how many persons are above the average height.
7. From a given paragraph perform the following using built–in functions:(i)Find the total number of words.(ii)Capitalize the first word of each sentence.(iii)Replace a given word with another word.
8. Solve towers of Hanoi using recursion.
9. Locate and Display the Contents of an Array using Pointers.
10. Generate salary slip of employees using structures and pointers.
11. Count the number of account holders whose balance is less than the minimum balance using sequential access file.

TOTAL: 45 +15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to,

- Explain the fundamental concepts of C programming and develop programs using data types, operators, expressions, and control structures.
- Develop C programs using arrays, strings, searching, and sorting techniques to solve computational problems.
- Construct modular C programs by applying functions, recursion, pointers, and parameter passing techniques.
- Develop applications using structures, unions, pointers, and dynamic memory allocation for efficient data organization and manipulation.
-
- Analyze file processing techniques using sequential and random access methods to perform data storage and retrieval operations.
- Develop reliable software solutions using C programming for real-world applications.

TEXT BOOKS

1. E.Balagurusamy,"Programming in ANSI C", Tata McGraw Hill, Eighth Edition, 2019.
2. Kernighan, B.W and Ritchie,D.M,"The C Programming language", Second Edition, Pearson Education, 2016.

REFERENCES

1. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Juneja, B. L and Anita Seth, "Programming in C", CENGAGE Learning India pvt.Ltd., 2011.

E – RESOURCES

1. https://nptel.ac.in/courses/106/105/106105085/ (Introduction to C Programming)
2. https://nptel.ac.in/courses/106/106/106106210/ File Operations)

Mapping of **COs-POs & PSOs**

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	–	2	–	–	1	–	1	–	2	3	2
2	3	3	3	2	3	–	–	1	1	1	–	2	3	3
3	3	3	3	2	3	–	–	1	1	1	–	2	3	3
4	3	3	3	2	3	–	–	1	1	1	–	2	3	3
5	3	3	2	3	3	–	–	2	1	1	–	3	3	3
6	3	3	3	3	3	2	1	2	2	2	2	3	3	3
AVG	3.00	2.83	2.67	2.40	2.83	2.00	1.00	1.33	1.20	1.17	2.00	2.33	3.00	2.83

1-Low 2-Medium 3-High '-' – No Correlation.

Chairman - BoS

23EEC101 **SOFTSKILLS & LIFE SKILLS** L T P C 1 0 0 1

(Common to all First year / First Semester B.E., B.Tech., Branches)

OBJECTIVES

- To understand the Universal Human Values
- To have an overview on Life skills required in their profession
- To manage the behavior with emotional intelligent skills
- To learn professional Skills required for 21st century
- To formulate and implement effective leadership strategies.

UNIT I UNIVERSAL HUMAN VALUES 3

Understanding harmony in the human being - understanding harmony in the family and society - understanding harmony in the nature and existence - understanding of harmony on professional ethics

UNIT II LIFE SKILLS 3

Soft Skills – Positive Attitude - Empathy - Effective Communication - Decision-Making Skills - Communication Skills - Problem Solving - Critical Thinking- Analytical thinking

UNIT III EMOTIONAL SKILLS 3

Self-Awareness - Interpersonal Relationship - Stress – Stress management - Focus and Self Control - Positive Thinking – Anger management

UNIT IV PROFESSIONAL SKILLS 3

21st century skills – Hard Skills - General computer skills - Spreadsheet proficiency - Career Skills - developing a long - term career plan – Team Work -- Time management

UNIT V LEADERSHIP SKILLS 3

Leadership, Levels of Leadership, Making of a leader, Types of leadership, describing a leadership style.

TOTAL: 15 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Treat and respect the human beings with harmony,
- Develop the capabilities needed to utilize their potential wherever required.
- Control their emotional feelings and manage the stress.
- Explore the career & professional skills.
- Become highly confident as a leader and find new ways of influencing the teams they lead.

TEXT BOOKS

1. Life Skills for Engineers, McGraw Hill Education (India) Private Ltd., 2016
2. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Sydänmaanlakka Pentti. "Intelligent leadership and leadership competencies". Dissertation Series.

REFERENCES

1. Barun K. Mitra; (2011), "Personality Development & Soft Skills", First Edition; Oxford Publishers.
2. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.

E-RESOURSES

1. **https://uhv.org.in/**
2. **https://nptel.ac.in**

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	1	-	-	-	2	2	2	3	2	1	-	-	-
2	1	3	1	1	-	1	1	-	2	3	3	1	-	-
3	-	1	-	-	-	1	1	-	3	3	3	1	-	-
4	2	2	1	1	3	1	1	-	2	3	3	3	-	-
5	1	1	1	-	-	2	2	-	3	3	3	3	-	-
AVG	1.25	1.6	1	1	3	1.4	1.4	2	2.6	2.8	2.6	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23MDC101 **INDUCTION PROGRAMME (2 Weeks)**

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have a broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."

"One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character."

Hence, the purpose of this programme is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

Physical Activity

This would involve a daily routine of physical activity with games and sports etc.

Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, make decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It would be effective that the faculty mentor assigned is also the faculty advisor for the student for the full duration of the UG programme.

Lectures by Eminent People

Motivational lectures by eminent people from all walks of life should be arranged to give the students exposure to people who are socially active or in public life.

Proficiency Modules

This would address some lacunas that students might have, for example, English, computer familiarity etc.

Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize them with the area as well as expose them to the underprivileged.

Familiarization to Dept./Branch & Innovations

They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

Induction Programme is totally an activity based programme and therefore there shall be no tests / assessments during this programme.

References: Guide to Induction program from AICTE

Chairman - BOS

SEMESTER II

23MAT203	MATHEMATICAL FOUNDATIONS OF COMPUTING	L	T	P	C
	[Common to CSE, CSE (CS), CSE (AI&ML), IT, and AI&DS]	3	1	0	4

OBJECTIVES

- To explore techniques for solving ordinary differential equations and recurrence relations.
- To compose the purpose of using Laplace transforms to create a new domain in which problems can be handled more easily.
- To develop the concepts of solving algebraic, transcendental and system of linear equations.
- To introduce the numerical techniques of interpolation and integration.
- To provide the knowledge of congruences and classical theorems in number theory.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS AND RECURRENCE RELATIONS 9+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Legendre's linear equations – Simultaneous linear equations with constant coefficients – Recurrence relations: Solving linear homogeneous recurrence relations with constant coefficients.

UNIT II LAPLACE TRANSFORMS 9+3

Definition – Conditions for existence – Transforms of elementary functions – Properties of Laplace transforms – Transform of Periodic functions – Transforms of derivatives and integrals – Multiplication by 't^n' and division by 't' – Evaluation of integrals by Laplace transforms – Inverse transforms – Convolution theorem – Application to solution of linear second order ordinary differential equations with constant coefficients.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

Solution of algebraic and transcendental equations by Newton Raphson method – Solution of simultaneous algebraic equations by Gauss elimination, Gauss Jordan and Gauss Seidel methods – Matrix Inversion by Gauss Jordan method – Eigen values of a matrix by Power method.

UNIT IV INTERPOLATION AND NUMERICAL INTEGRATION 9+3

Interpolation with equal intervals: Newton's forward interpolation formula – Newton's backward interpolation formula – Interpolation with unequal intervals: Lagrange's interpolation formula – Divided differences – Newton's divided difference formula – Numerical integration: Trapezoidal rule – Simpson's one-third rule – Numerical double integration by Trapezoidal rule.

UNIT V CONGRUENCES AND CLASSICAL THEOREMS 9+3

Congruences – Linear Congruences – The Chinese Remainder Theorem – 2 x 2 Linear Systems – Wilson's Theorem – Fermat's Little Theorem – Euler's Theorem.

OUTCOMES

Upon completion of the course, Students will be able to:

- Apply appropriate techniques to solve ordinary differential equations and recurrence relations.
- Solve engineering problems using the concept of Laplace transforms.

- Compute the numerical solution of algebraic, transcendental and system of linear equations.
- Apply the numerical techniques of interpolation and integration.
- Analyze the concepts of congruences and classical theorems in number theory.

LIST OF EXPERIMENTS

1. Solving ordinary differential equations.
2. Compute homogeneous recurrence relations.
3. Calculate Laplace Transform of simple functions.
4. Calculate Inverse Laplace transform of a given function.
5. Solution of simultaneous algebraic equations by Gauss Seidel method.
6. Find the Eigen values of a matrix by Power method.
7. Illustrate Lagrange's interpolation formula.
8. Evaluation of line integral by Simpson's one-third rule.
9. Determine congruence relations.
10. Solving problems in Chinese Remainder Theorem.

TOTAL: 45+15 PERIODS

TEXT BOOKS

1. Grewal B.S.,"Higher Engineering Mathematics", Khanna Publishers, Fourty fourth Edition, 2022.
2. Grewal,B.S., "Numerical Methods in Engineering and Science", Khanna Publishers, Eleventh Edition, 2023.

REFERENCES

1. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, Tenth Edition, 2016.
2. Thomas Koshy, "Elementary Number Theory with Applications", Elsevier Publishers, Second Edition, 2007.

E-RESOURCES

1. https://archive.nptel.ac.in/courses/111/102/111102129/ (Transforms)
2. https://nptel.ac.in/courses/111/107/111107105/ (Numerical Methods)
3. http://nitttrc.edu.in/nptel/courses/video/106108227/L58.html (Congruences)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	2	-	-	-	-	-	-	2	-	-
2	3	3	2	2	2	-	-	-	-	-	-	2	-	-
3	3	2	2	1	2	-	-	-	-	-	-	2	-	-
4	3	2	2	1	2	-	-	-	-	-	-	2	-	-
5	3	2	2	1	2	-	-	-	-	-	-	2	-	-
AVG	3	2.4	2	1.4	2	-	-	-	-	-	-	2	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23PHT202	ADVANCED PHYSICS FOR COMPUTER ENGINEERING	L T P C
	(Common to CSE, CSE(SC), CSE (AI&ML), IT and AI&DS)	3 0 0 3

OBJECTIVES

- To provide knowledge on semiconductor physics and technologies used in Computer Engineering.
- To explain the working principles of magnetic devices and sensors applied in computer systems.
- To impart understanding of optical phenomena in display device fabrication and nanoelectronic devices.
- To teach the fundamentals of fiber optics and data transmission systems.
- To introduce emerging technologies in Computer Engineering.

UNIT I SEMICONDUCTORS & TECHNOLOGIES **9**

Elemental and Compound Semiconductors – Intrinsic Semiconductor & Extrinsic Semiconductor – Intrinsic Carrier Concentration Derivation– Semiconductor Devices for Computer (Diodes and Transistors) - MOSFET- basic operation and fabrication - Latest developments in semiconductor technology – system on chip.

UNIT II MAGNETIC DEVICES & SENSORS **9**

Ferromagnetism and their Properties - Domain Theory of Ferromagnetim – Hard and Soft magnetic Materials - Magnetic Storage Devices - Modern Hard Disk Drive technologies. SENSORS – Classification of Sensors – Types of Sensors - Sensors in Internet of Things (IOT) – Image sensors (CCD & CMOS)

UNIT III DISPLAY DEVICES & NANOELECTRONIC DEVICES **9**

Introduction - Electroluminescence Process - Liquid Crystal Display - TFT-LCD – LED Display Touch screen Display - Organic LED display – Micro LED display - Quantum Dots Display.

Nanoelectronic Devices: Nanoscale MOSFETs - Nano and Micro Opto -Electro-Mechanical Systems (NOEMS/MOEMS).

UNIT IV FIBER OPTICS & DATA TRANSMISSION SYSTEMS **9**

Principle and Propagation of Light in an Optical Fibers - Fiber Optics: Principle, Acceptance Angle - Numerical Aperture,— types of Optical Fibers (Material, Refractive Index, Mode) – Fiber Optic Communication Systems – Bluetooth - Wi-Fi – Li-Fi – Infrared Data Transfer – Satellite data transmission and reception.

UNIT V EMERGING TECHNOLOGIES **9**

Quantum Computing - 3D Printing - 5G & 6G Cellular Communications - Explainable Artificial Intelligence(AI) - Biometrics - Cloud Computing - Quantum Cryptography - Robotic Process Automation - Wearable Computing Virtual Reality(VR) – Augmented Reality (AR) – Mixed Reality (MR).

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, students will be able to:

- Explain the principles of semiconductors and their applications in computer engineering technologies.
- Describe the working of magnetic devices and sensors used in computer systems.
- Explain optical phenomena in display devices and the basics of nanoelectronic devices.
- Describe the fundamentals of fiber optic communication and data transmission systems.
- Identify and explain emerging technologies in Computer Engineering.

TEXT BOOKS

1. Rajendran V, "Engineering Physics", Tata McGraw Hill Publications, 2015.
2. Sze S. M., Lee M. K., "Semiconductor Physics and Devices" Wiley, 2021.
3. Brajesh Kumar Kaushik, "Nanoelectronics: Devices, Circuits and Systems (Micro and Nano Technologies)", Elsevier, 2018.

REFERENCES

1. Simon M. Sze, Kwok K. Ng, "Physics of Semiconductor Devices", Wiley-Interscience, 2016.
2. Takao Kuroda, "Essential Principles of Image Sensors", CRC Press, 2021.
3. *B.P.Pal , "Fundamentals of Fibre Optics in Telecommunication and Sensor Systems" New Age International Private Limited, 2023.*

E – RESOURCES

1. https://novapublishers.com/shop/internet-of-everything-smart-sensing-technologies/
2. https://www.ukri.org/news/revealed-the-50-new-technologies-that-could-shape-the-future/

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	1	3	1	2	3	-	3	-	-
2	-	-	-	-	-	1	2	-	1	3	-	3	-	-
3	-	-	-	-	-	3	3	2	3	3	-	3	-	-
4	-	-	-	-	-	1	2	1	2	3	-	3	-	-
5	-	-	-	-	-	1	1	1	1	3	-	3	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	-	-	-	1.40	2.20	1.25	1.80	3.00	-	3.00	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23CYT201 **ENVIRONMENTAL SCIENCE AND SUSTAINABILITY** **L T P C**

(Common to All B.E. /B.Tech. Branches) **3 0 0 3**

OBJECTIVES

- To familiarize students with the concepts of environment, ecosystems, biodiversity, and their conservation.
- To create awareness about environmental pollution, individual responsibilities in pollution prevention, and basic disaster management.
- To impart knowledge about major social and environmental issues, environmental protection laws, and green chemistry principles.
- To analyze population-related issues, human health, social welfare, and the role of information technology in environmental and human health.
- To develop an understanding of sustainability concepts, climate change issues, and sustainable management practices for addressing environmental challenges.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 9

Definition, scope and importance of environment – Need for public awareness - Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (d) aquatic ecosystems (oceans) – Introduction to biodiversity definition: genetic, species and ecosystem diversity –Value of biodiversity – Threats to biodiversity – Endangered and endemic species of India – Conservation of biodiversity: In-Situ and Ex-Situ conservation of biodiversity.

Activity: Biodiversity in and around the campus and report submission.

UNIT II ENVIRONMENTAL POLLUTION 9

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution – Solid waste management: causes, effects and control measures of municipal solid wastes - E-waste – Role of an individual in prevention of pollution - Pollution case studies – Disaster management: floods, earthquake and cyclone.

Activity: Local pollution case study and report submission.

UNIT III SOCIAL ISSUES AND THE ENVIRONMENT 9

Water conservation, rain water harvesting, watershed management – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Green Chemistry and principles - Environment production act – Air (Prevention and Control of Pollution) act –Water (Prevention and control of Pollution) act

Activity: Creating environmental awareness.

UNIT IV HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth, variation among nations – Population explosion – Family welfare programme –

Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies.

Activity: Visit to local primary health center.

UNIT V SUSTAINABLE MANAGEMENT **9**

Sustainability-Concept, needs and challenges-economic, social and aspects of sustainability-From unsustainability to sustainability-—Sustainable Development Goals-Targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-Case studies. Zero waste, Material Life cycle assessment, Sustainable habitat: Energy efficiency, Sustainable transports.

Activity: Field trips to local organizations or facilities with sustainable practices in place.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the basics of environment, ecosystems, biodiversity, and conservation.
- Identify major sources of pollution and understand individual responsibilities in pollution prevention and disaster management.
- Describe key social and environmental issues, environmental laws, and green chemistry principles.
- Analyse population growth, human health, social welfare, and the role of IT in environmental and health management.
- Apply sustainability concepts, climate change mitigation, and sustainable management practices to environmental challenges.

TEXT BOOKS

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, 2019.
2. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", Eighth Edition, Pearson Education, 2021.
3. Allen, D. T. and Shonnard, D. R., "Sustainability Engineering: Concepts, Design and Case Studies", Third Edition, Prentice Hall, 2018.

REFERENCES

1. Erach Bharucha, "Textbook of Environmental Studies", Universities Press (I) Pvt Ltd, 2016.
2. Dharmendra S. Sengar, "Environmental law", Prentice hall of India Pvt Ltd, 2018.
3. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2019.

E-RESOURCES

1. https://nptel.ac.in/courses/122102006/
2. https://swayam.gov.in/nd1_noc19_ge22/preview

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	2	3	-	-	3	3	3	-	-	2	1	-	-
2	2	2	3	2	3	3	3	3	-	-	3	3	-	-
3	2	1	3	2	2	3	3	3	-	2	3	3	-	-
4	2	1	3	2	3	3	3	3	2	3	2	2	-	-
5	2	1	3	2	3	3	3	3	2	3	2	2	-	-
AVG	2	1.4	3	2	2.8	3	3	3	2	2.7	2.4	2.2	-	-

1 - Low 2 - Medium 3 - High '-' – No Correlation

Chairman - BoS

23HST202 **TAMILS AND TECHNOLOGY** LT P C
1 0 0 1

OBJECTIVES

- To gain knowledge about weaving and ceramic Technology
- To create a design and construction Technology
- To analyze manufacturing Technology
- To apply agriculture and irrigation Technology
- To remember scientific and scientific Tamil and Tamil computing

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) -- Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)-ThirumalaiNayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project

TOTAL: 15 PERIODS

OUTCOMES

Upon the completion of the course, the students will be able to:

- Understand weaving under ceramic Technology.
- Develop new design and construction Technology.
- Identify the manufacturing Technology.

- Understand agriculture and irrigation.
- Knowledge of scientific Tamil and Tamil computing.

TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் – கே. கே. பிள்ளை– (வெளியீடு:தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4. பொருநை -ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறைவெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	2	1	-	-	1	-	-
2	-	-	-	-	-	-	-	2	1	-	-	1	-	-
3	-	-	-	-	-	-	-	2	1	-	-	1	-	-
4	-	-	-	-	-	-	-	2	1	-	-	1	-	-
5	-	-	-	-	-	-	-	2	1	-	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	-	-	1	-	-

1 - Low 2 - Medium 3 - High '-' – No Correlation

Chairman - BoS

23HST202	தமிழரும் தொழில்நுட்பமும்	L T P C
	(அனைத்து துறைகளுக்கும் பொதுவானது)	1 0 0 1

நோக்கம்

மாணவர்கள் கண்டிப்பாக அறியவேண்டுவன:

- நெசவு மற்றும் பீங்கான் தொழில்நுட்பம் பற்றிய அறிவைப் பெறுதல்.
- வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பத்தை உருவாக்குதல்.
- உற்பத்தி தொழில்நுட்பத்தைப் பகுப்பாய்வு செய்தல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத் தொழில்நுட்பத்தைப் பயன்படுத்துதல்.
- அறிவியல்மற்றும்அறிவியல்தமிழ்மற்றும்தமிழ்கணிப்பொறிதொடர்பானஅறிவைநினைவில்கொள்ளுதல்.

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்: 3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத்தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பண்டங்களில் கீறல் குறியீடுகள்.

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: 3

சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்ககாலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு- சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக்கோயில்கள் மாதிரி கட்டமைப்புகள் பற்றி அறிதல் மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள்– பிரிட்டிஷ்காலத்தில் சென்னையில் இந்தோ – சரோசெனிக் கட்டிடக் கலை.

அலகு III உற்பத்தித் தொழில்நுட்பம்: 3

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சலை –இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள்,கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்குமணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம்: 3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் –
வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்து பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்: 3

அறிவியல் தமிழின் வளர்ச்சி – கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ்

மின்நூலகம் – இணையத்தில் தமிழ்அகராதிகள்– சொற்குவைத் திட்டம்

TOTAL: 15 PERIODS

முடிவுகள்

பாடத்தின் முடிவில், மாணவர்கள் அறிந்துகொள்வன

- பீங்கான் மற்றும் நெசவு தொழில்நுட்பத்தைப் புரிந்து கொள்ளுதல்.
- புதிய வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பத்தைஉருவாக்குதல்.
- உற்பத்தித் தொழில்நுட்பத்தை அடையாளம் காணுதல்.
- விவசாயம் மற்றும் நீர்ப்பாசனத்தைப் புரிந்து கொள்ளுதல்.
- அறிவியல் தமிழ் மற்றும் தமிழ் கணிப்பொறி தொடர்பான அறிவை பெறுதல்.

உரைமற்றும்குறிப்புபுத்தகங்கள்

1. தமிழகவரலாறு - மக்களும்பண்பாடும் – கே. கே. பிள்ளை– (வெளியீடு:தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4. பொருநை -ஆற்றங்கரைநாகரீகம். (தொல்லியல்துறைவெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi – 'Sangam City Civilization on the banks of the river Vaigai' (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
10. Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu.)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	2	1	-	-	1	-	-
2	-	-	-	-	-	-	-	2	1	-	-	1	-	-
3	-	-	-	-	-	-	-	2	1	-	-	1	-	-
4	-	-	-	-	-	-	-	2	1	-	-	1	-	-
5	-	-	-	-	-	-	-	2	1	-	-	1	-	-
AVG	-	-	-	-	-	-	-	2	1	-	-	1	-	-

1 - Low 2 - Medium 3 - High '-' – No Correlation

Chairman - BoS

23HSE201 **ENGLISH FOR ENGINEERS: THEORY AND PRACTICE** L T P C
(Common to all B.E. & B.Tech. Branches) 3 0 2 4

OBJECTIVES

- To strengthen grammatical accuracy for effective communication.
- To develop listening and reading comprehension skills.
- To improve writing proficiency for academic and formal purposes.
- To train in business and professional correspondence.
- To enhance speaking abilities for social and professional contexts.
- To provide practical exposure through interactive language activities.

UNIT I GRAMMAR 9

Articles - Prepositions - Conditionals - Subject verb agreement - Error Spotting - Active and Passive voice.

UNIT II LISTENING & READING 9

Syllabification – Improving Vocabulary - Reading Newspapers - Listening to Youtube Documentaries - Listening to Podcast - Listening to Motivational Movies.

UNIT III WRITING 9

Checklist - Recommendations - Formal letters – inviting guests – acceptance/declining letters

UNIT IV BUSINESS WRITING 9

E-mail writing - fixing an appointment, cancelling appointment, paper submission for seminars and conferences - Job Application Letter and Résumé.

UNIT V SPEAKING 9

Collaborative task - Turn taking (initiating and responding appropriately) - Negotiating - Exchanging - Suggesting - Comparing and Contrasting - Situational Role-play.

TOTAL: 45 PERIODS

	LIST OF EXERCISES
1.	Stage Dynamics (Body Language and Paralanguage - Presentation)
2.	Day today real time speaking exposures – Story narration, simple, general topics and

	incidents.
3.	Group Discussion
4.	Power Point Presentation (Corporate Skills & Public Speaking)
5.	Loud Reading
6.	Picture Description
7.	Interview Skills (Mock Interview & Interview Etiquette)
8.	Case Study Report

TOTAL: 15 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Use correct grammar in speech and writing.
- Understand and interpret information from various audio and reading sources.
- Write clear, structured, and formal documents.
- Prepare professional emails, résumés, and job-related letters.
- Communicate effectively in group discussions and presentations.
- Apply communication skills confidently in real-time situations.

TEXT BOOKS

1. S. Sumant, "Technical English II", Maven Learning Private Limited, 2012.
2. Joshi, Manmohan, *"Soft Skills"*, First Edition, Bookboon, 2017.

REFERENCES

1. Dr K Elango, Dr. Veena Selvam, Dr. Sujatha Priyadarshini, "Resonance English for Engineers and Technologists", Cambridge University Press, First Edition, 2013.
2. Seely, John. "Oxford Guide to Effective Writing and Speaking", Oxford University Press. UK, 2013.

E-RESOURCES

1. https://www.fluentu.com/Blog/english/english-small-talk
2. https://www.britishcouncil.com

EXTENSIVE READING

1. Stephen R. Covey, " The 7 Habits of Highly Effective People", Simon & Schuster, 2019.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	1	-	-	-	1	-	-	-	2	3	-	2	-	-
2	1	2	-	2	-	-	-	-	-	3	-	1	-	-
3	1	-	-	-	-	-	-	1	-	3	2	2	-	-
4	-	-	-	-	1	-	-	2	-	3	2	2	-	-
5	-	-	-	-	-	-	-	1	3	3	2	1	-	-
6	-	-	-	-	-	2	2	2	2	3	-	2	-	-
AVG	1	2	-	2	1	2	2	1.5	2.3	3	2	1.6	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23EEE202	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to AIDS, CSE, CSE-CS, IT, Robotics, PT)	LT P C 3 0 2 4

OBJECTIVES

- To enhance the basic concepts of DC and AC electrical circuits and fundamental circuit laws.
- To impart knowledge on the construction, working principles, and applications of basic electrical machines.
- To instruct the operation and characteristics of basic semiconductor devices.
- To familiarize the fundamentals of number systems and basic digital logic circuits in digital world.
- To instruct the principles of electrical measuring instruments and power measurement.
- To provide knowledge on basic electrical and electronic concepts through simple hands-on experiments.

UNIT I ELECTRICAL CIRCUITS 9

DC circuits: Circuit components: Conductor, Resistor, Inductor, Capacitor - Ohm's Law - Kirchhoff's sources only (Steady state) – Thevenin's theorem – Maximum Power Transfer theorem.Laws - Independent and Dependent sources - Nodal analysis, Mesh analysis with Independent

Introduction to AC circuits and parameters: Waveforms, Average value, RMS value, Instantaneous power, real power, reactive power and apparent power, power factor - Steady state analysis of RL, RC & RLC circuits.

UNIT II ELECTRICAL MACHINES 9

DC Generators: Construction and working principle, EMF equation, Types and applications – DC Motors: Working principle, Types and applications - Construction, Working principle and applications: Single phase transformer, Three phase alternator and Three phase induction motor – BLDC Stepper Motor – PMSM.

UNIT III ANALOG ELECTRONICS 9

PN junction diodes and its applications - Zener diode: structure, operation, Zener diode as regulator – Biasing of BJT - JFET, SCR, MOSFET, IGBT - Types, VI characteristics.

UNIT IV DIGITAL ELECTRONICS 9

Review of number systems, binary codes, Combinational logic - Representation of logic functions - SOP and POS forms, K-map representations - Minimization using K maps - Half adder, Full adder – Multiplexer, Demultiplexer

UNIT V MEASUREMENTS AND INSTRUMENTATION 9

Operating principle and Types of Moving coil and Moving iron meters - Measurement of power and Energy meter - Data acquisition.

LIST OF EXPERIMENTS

1. Verification of KVL & KCL.
2. Load test on DC shunt motor.
3. Characteristics of PN and zener diodes
4. Characteristics of BJT.
5. Half wave and full wave rectifiers
6. Verifications of Half adder and Full adder.
7. Measurement of power and Energy meter.

TOTAL : 45+15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the basic electrical laws and theorems to analyze simple DC and AC circuits.
- Explain the working principles and applications of DC machines, transformers and motors.
- Analyze the characteristics and applications of diodes and semiconductor devices.
- Apply the digital logic concepts to design and analyze simple combinational circuits.
- Examine the operation of electrical instruments and basic data acquisition systems.
- Analyze the basic electrical and electronics concepts by performing simple hands-on laboratory experiments and interpreting the results

TEXT BOOKS

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering"; Second Edition, McGraw Hill Education, 2020.
2. S. K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2019.

REFERENCES

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", McGraw Hill Education, Fourth Edition, 2019.
2. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2021.

E-RESOURCES

1. https://nptel.ac.in/courses/108108076 - (Basics of Electrical Technology).
2. https://www.digimat.in/nptel/courses/video/108105112/L01.html - (Fundamentals of Electrical Engineering).

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	2	1	3	-	1	-	3	-	-	-	-	2	-	-
2	1	-	2	-	1	-	-	-	-	-	-	-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	1	-	-
4	1	1	2	1	-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-
6	2	3	-	2	3	-	-	-	-	-	-	-	-	-
AVG	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-

1-Low 2-Medium 3-High '-' – No Correlation.

Chairman - BoS

23CST201	PC HARDWARE SERVICES AND NETWORKING	L T P C
		3 0 0 3

OBJECTIVES

- To impart the students with fundamental components of a motherboard, memory devices and their functionalities.
- To enable students to understand operation of IO devices, interfaces and common troubleshooting techniques.
- To train the students in the BIOS setup functions, Power management, and necessary precautions of PC maintenance.
- To foster the students in troubleshooting techniques for diagnosing, and resolving hardware-related issues.
- To familiarize students with the fundamentals of data communication, computer networking concepts.

UNIT I MOTHERBOARD COMPONENTS AND MEMORY STORAGE DEVICES 9

Introduction: Hardware, Software and Firmware. Mother board, IO and memory expansion slots, SMPS-Processors: Architecture and block diagram of multicore Processor, Features of new processor-chipsets (Concepts only). Bus Standards: Overview and features of PCI, AGP, PCMCIA Primary Memory-Secondary Storage-Removable Storage.

Problem - Solving Assignments

1. Identify the motherboard type.
2. Explain how you will verify chipset compatibility.

UNIT II I/O DEVICES AND INTERFACE 9

Keyboard: Signals –mechanical keyboards–troubleshooting - wireless Keyboard. Mouse: types, connectors, operation of Optical mouse and Troubleshooting. Printers: Types of printers- Dot Matrix, Inkjet Laser, MFP (Multi Function Printer) and Thermal printer-I/O Ports: Serial, Parallel, USB, Game Port and HDMI. Displays: Principles of LED, LCD and TFT Displays-Modem: Working principle. Power Supply: Servo Stabilizers, online and offline UPS - working principles.

Problem - Solving Assignments

1. Keyboard Not Working Issue ,USB keyboard is not detected.List troubleshooting steps.
2. A system consumes 400W power.Suggest suitable UPS capacity.

UNIT III MAINTENANCE OF DESKTOP 9

Bios-setup: Standard CMOS setup, Advanced BIOS setup, Power management, advanced chipset features, PC Bios communication– upgrading BIOS, Flash BIOS -setup.POST: Definition – IPL hardware – POST Test sequence – beepcodes.Diagnostic Software and Viruses:Computer Viruses – Precautions – Anti-virus Software – identifying the signature of viruses – Firewalls and latest diagnostic softwares

Problem - Solving Assignments

REFERENCES

1. T Stephen Rood, "Computer Hardware Maintenance", 1st Edition, Elsevier, 1996.
2. Christian Huitema, "Internet Routing Architectures", 2nd Edition, Prentice Hall, 2000.

E – RESOURCES

1. https://archive.nptel.ac.in/courses/106/106/106106144/ (PC Hardware fundamentals)
2. https://onlinecourses.nptel.ac.in/noc22_cs19/(Computer Networks and Internet Protocol)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	–	2	–	–	1	–	1	–	2	3	2
2	3	3	2	2	3	–	–	1	1	1	–	2	3	3
3	3	3	2	2	3	–	–	2	1	1	–	2	3	3
4	3	3	3	3	3	2	1	2	1	2	–	3	3	3
5	3	3	2	2	3	1	1	1	2	2	–	3	3	3
6	3	3	3	3	3	2	2	2	3	2	2	3	3	3
AVG	3.00	2.83	2.17	2.40	2.83	1.67	1.33	1.50	1.60	1.50	2.00	2.50	3.00	2.83

1 - Low, 2-Medium, 3-High,"-" - No Correlation

Chairman - BoS

1. A system shows unwanted pop-ups and slow performance.Suggest antivirus and firewall solutions.
2. A new processor is not detected.Explain BIOS update process.

UNIT IV TROUBLESHOOTING OF DESKTOP AND LAPTOPS 9

Laptop: Types of laptop –block diagram – working principles–configuring laptops and power settings -SMD components, ESD and precautions. Laptop components: Adapter – types, Battery – types, Laptop Mother Board - block diagram,Laptop Keyboard and Touchpad .Installation and Troubleshooting: Formatting, Partitioning and Installation of OS – Trouble Shooting Laptop Hardware problems - Preventive maintenance techniques for laptops.

Problem - Solving Assignments

1. During Windows installation, hard disk not detected, Identify reasons.
2. Laptop Not ChargingCheck adapter, battery, charging port.

UNIT V COMPUTER NETWORK DEVICES 9

Data Communication: Components of a data communication.Data flow: simplex – half duplex – full duplex;Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology.Networks: Definition -Types of Networks: LAN – MAN – WAN –CAN – HAN – Internet –Intranet – Extranet, Client-Server, Peer To Peer Networks.Network devices: Features and concepts of Switches – Routers(Wired and Wireless) – Gateways.

Problem - Solving Assignments

1. Two systems cannot communicate.Check IP configuration.
2. Compare Star and Mesh topology for a bank network.

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the functionalities of computer hardware components, motherboard, memory devices
- Demonstrate operation, configuration, and troubleshooting of input/output devices.
- Analyze BIOS setup functions and virus prevention techniques for system maintenance.
- Analyze hardware and software issues in desktop and laptop and use troubleshooting techniques to solve the issues.
- Explain the principles of data communication, network topologies, and networking devices.

TEXT BOOKS

1. Scott Mueller, Upgrading and Repairing *PCs*, 22nd Edition, Que Publishing (Pearson), 2011. (A guide to PC hardware, troubleshooting, repair, upgrades, diagnostics and servicing).
2. Behrouz A. Forouzan, *Data* Communications and Networking, 6th Edition, McGraw-Hill Education, 2022.

23GEL201	ENGINEERING PRACTICES LABORATORY	LT P C
	(Lab Embedded Theory Course)	0 0 4 2

OBJECTIVES

The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.
b) Preparing plumbing line sketches.
c) Laying pipe connection to the suction side of a pump
d) Laying pipe connection to the delivery side of a pump.
e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

a) Sawing,
b) Planning and
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture
b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

a) Introduction to switches, fuses, indicators and lamps - Basic switch boardwiring with lamp, fan and three pin socket
b) Staircase wiring

c) Fluorescent Lamp wiring with introduction to CFL and LED types.

d) Energy meter wiring and related calculations/ calibration

e) Study of Iron Box wiring and assembly

f) Study of Fan Regulator (Resistor type and Electronic type using Diac /Triac /quadric)

g) Study of emergency lamp wiring/Water heater

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.

b) (simple)Drilling.

c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.

b) Assembling a household mixer.

c) Assembling an air conditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone..

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop.

TOTAL: 60 PERIODS

OUTCOMES

Upon completion of this course, the students will be able to:

CO1: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

CO2: Wire various electrical joints in common household electrical wire work.

CO3: Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.

CO4: Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	-	-	1	1	1	-	-	-	-	2	2	1
2	3	2	-	-	1	1	1	-	-	-	-	2	2	1
3	3	2	-	-	1	1	1	-	-	-	-	2	2	1
4	3	2	-	-	1	1	1	-	-	-	-	2	2	1
AVG	3	2	-	-	1	1	1	-	-	-	-	2	2	1

1-Low 2-Medium 3-High '-' – No Correlation

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23EEC201 **INDIAN LANGUAGE**

(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE L T P C
(Common to all B.E. & B.Tech. Branches) 0 0 4 2

OBJECTIVES

- To learn the Hindi alphabet, pronunciation, and basic writing.
- To understand and use basic Hindi grammar correctly.
- To develop basic reading, writing, listening, and speaking skills in Hindi.
- To use Hindi for simple everyday communication.
- To prepare learners to successfully clear the Hindi Examination.

UNIT I वर्णमालाएवंमूलभूतव्याकरण (ALPHABET AND BASIC GRAMMAR) 5

Hindi Vowels (स्वर)- Hindi Consonants (व्यंजन) -Matras (मात्राएँ)- Barakhadi (बारहखड़ी)-Word Formation (शब्दनिर्माण)- Gender (लिंग)- Number (वचन)- Basic Sentence -Formation (सरलवाक्यरचना)

UNIT II शब्दभंडारएवंव्याकरण (VOCABULARY AND GRAMMAR) 7

Nouns (संज्ञा)- Pronouns (सर्वनाम) -Adjectives (विशेषण) -Verbs (क्रिया) -Tenses (काल– Present, Past, Future) - Opposite Words (विलोमशब्द) -Synonyms (पर्यायवाची) -One-word Substitutions (अनेकशब्दोंकेलिएएकशब्द)

UNIT III पठनएवंलेखनकौशल (READING AND WRITING SKILLS) 7

Reading Simple Hindi Passages -Comprehension (गद्यांश) -Paragraph Writing (अनुच्छेदलेखन)- Letter Writing (पत्रलेखन)- Dialogue Writing (संवादलेखन) -Picture Description (चित्रवर्णन) -Dictation Practice (श्रुतिलेख)

UNIT IV दैनिकजीवनमेंहिंदी (HINDI FOR EVERYDAY COMMUNICATION) 7

Greetings and Introductions -Family Members (परिवार)- Days, Months, Seasons -Numbers (१–१००) -Time and Date - Colours, Fruits, Vegetables - Shopping Conversations - School and Classroom Vocabulary - Common Everyday Conversations

UNIT V साहित्यएवंपुनरावृत्ति (LITERATURE AND REVISION) 4

Simple Poems (कविताएँ)- Short Stories (लघुकथाएँ)- Proverbs and Idioms (मुहावरेएवंलोकोक्तियाँ– basic) -Moral Stories - Translation (English/Tamil to Hindi – Simple Sentences) - Revision of Grammar - Model Question Papers and Practice Tests

TOTAL: 30 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

1. Write basic Hindi words and sentences.
2. Apply fundamental Hindi grammar in simple communication.
3. Develop basic reading, writing, listening, and speaking skills in Hindi.
4. Use Hindi confidently in day-to-day conversations.

5. Develop proficiency required to successfully clear the Hindi Examination

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
2	-	-	-	-	-	-	-	1	1	3	-	1	-	-
3	-	-	-	-	-	-	-	1	2	3	-	2	-	-
4	-	-	-	-	-	1	1	2	2	3	-	1	-	-
5	-	-	-	-	-	-	-	-	-	2	-	3	-	-
AVG	-	-	-	-	-	1.0	1.0	1.3	1.6	2.8	-	1.6	-	-

1-Low 2-Medium 3-High '-' – No Correlation.

Chairman - BoS

23EEC201 **INDIAN LANGUAGE**

(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE **L T P C**

(Common to all B.E. & B.Tech. Branches) **0 0 4 2**

OBJECTIVES

- To learn the German alphabet, pronunciation, and basic communication.
- To understand and use basic German grammar and vocabulary.
- To communicate in German in simple everyday situations.
- To develop basic reading, writing, listening, and speaking skills in German.
- To apply basic German language skills confidently through practice and revision.

UNIT I INTRODUCTION TO GERMAN LANGUAGE 6

German alphabet and pronunciation – Greetings - Self-introduction (Name, age, nationality, profession) - Numbers (0–100) -Days, months, seasons, and dates - Basic classroom expressions - Personal pronouns -Verb **sein** (to be) -Simple sentence formation

UNIT II BASIC GRAMMAR AND VOCABULARY 7

Definite and indefinite articles (der, die, das; ein, eine) - Nouns and gender - Singular and plural forms - Verb conjugation (regular verbs) - Present tense - Question words (Wer, Was, Wo, Wann, Wie, Warum) - Negation (nicht, kein) - Vocabulary: Family, occupations, countries, languages, colors

UNIT III EVERYDAY COMMUNICATION 7

Daily routine - Time and clock reading - Food and beverages - Shopping conversations - Asking for and giving directions -Making simple requests -Modal verbs (möchten, können) -Vocabulary: Home, school, transportation, weather

UNIT IV READING, WRITING, LISTENING, AND SPEAKING SKILLS 5

Reading short dialogues - Listening to simple conversations - Writing short paragraphs - Describing people, places, and objects - Introducing family and friends

UNIT V PRACTICAL APPLICATIONS AND REVISION 5

Travel and tourism vocabulary - At the restaurant - At the railway station and airport - Revision of grammar topics - Translation of simple sentences (English to German and German to English)

TOTAL: 30 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the German alphabet and pronounce basic German words correctly.
- Use basic German vocabulary and simple grammar in sentences.
- Practice in simple German for everyday situations.
- understand basic German texts and conversations.

- Apply basic German language skills confidently in simple real-life situations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	-	-	-	-	-	3	-	1	-	-
2	-	-	-	-	-	-	-	1	1	3	-	1	-	-
3	-	-	-	-	-	1	1	2	2	3	-	2	-	-
4	-	-	-	-	-	-	-	1	2	3	-	2	-	-
5	-	-	-	-	-	1	1	2	2	3	-	2	-	-
AVG	-	-	-	-	-	1	1	1.5	1.7	3	-	1.6	-	-

1-Low 2-Medium 3-High '-' – No Correlation

P. Kavitha
Chairman - BoS

23EEC201 **INDIAN LANGUAGE**

(EXCEPT MOTHER TONGUE) / FOREIGN LANGUAGE **L T P C**

(Common to all B.E. & B.Tech. Branches) **0 0 4 2**

OBJECTIVES

- To learn the Japanese writing system, pronunciation, and basic vocabulary.
- To understand and use basic Japanese grammar and sentence patterns.
- To communicate in Japanese in simple everyday situations.
- To develop basic reading, writing, listening, and speaking skills in Japanese.
- To apply basic Japanese language skills confidently through practice and real-life communication.

UNIT I WRITING SYSTEMS & PRONUNCIATION 5

Hiragana chart reading and writing - Katakana chart reading and writing - Basic pronunciation rules (long vowels, double consonants) – Numbers - Colours, body parts, pets description

UNIT II KANJI & BASIC GRAMMAR 7

First 50 Kanji (Numbers, Time & Days, Basic Directions & People) - Topic marker は (wa) - Identification sentences: Noun + です (desu) - Possession particle の (no) - Inclusion particle も (mo) - Subject marker が (ga) - Direction particles へ (he) and に (ni) - Self-introductions and greetings (Aisatsu) - Numbers, prices, shopping terms - Days, months, relative time - Family members and occupations

UNIT III KANJI & FUNCTIONAL GRAMMAR 8

Next 50 Kanji (Nature, Core Verbs, Adjectives & Nouns) - Verb groups (Group 1, Group 2, Group 3) - Masu forms (Present, Past, Positive & Negative) - Te-form (~て): requests, connecting sentences, continuous actions (~ている) - Adjective conjugation (い & な adjectives) - Desires (~たい) and Invitations (~ましょう)

UNIT IV VOCABULARY & FUNCTIONAL COMMUNICATION 5

Action verbs (daily routine, hobbies) - Adjectives for people, food, and places - Positional words (inside, outside, next to, between) - Transport, travel, and location vocabulary - Simple conversations in everyday situations

UNIT V READING & LISTENING COMPREHENSION 5

Reading short sentences in Hiragana, Katakana, and basic Kanji - Understanding classroom instructions - Listening to slow, clear daily-life conversations - Understanding simple shopping dialogues

TOTAL: 30 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Identify the Japanese writing system and pronounce basic Japanese words correctly.
- Use basic Japanese vocabulary and simple grammar in sentences.
- Communicate in simple Japanese for everyday situations.
- Read, write, listen to, and understand basic Japanese texts and conversations.

- Apply basic Japanese language skills confidently in simple real-life situations.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	-	-	-	-	1	1	1	-	1	2	-	-	-	-
2	-	-	-	-	1	2	2	-	2	2	-	-	-	-
3	-	-	-	-	2	2	2	1	2	3	-	1	-	-
4	-	-	-	-	2	2	2	1	3	3	-	1	-	-
5	-	-	-	-	1	1	1	1	2	3	-	1	-	-
AVG	-	-	-	-	1.4	1.6	1.6	1	0.2	2.6	-	1	-	-

1-Low 2-Medium 3-High '-' – No Correlation

P. Kavitha
Chairman - BoS

23MDC201	APTITUDE SKILLS (Common to all Branches)	L T P C 3 0 0 0

OBJECTIVES

- To introduce the basics concepts and techniques of numbers, Highest common factor and Least common multiple.
- To develop the use of decimal fraction and problems on ages.
- To introduce the basic concepts of time, work, distance, calendar and clock.
- To explain the student with the concept of simple and compound interest.
- To provide the knowledge of polynomial and quadratic equations.

UNIT I NUMBERS, HIGHEST COMMON FACTOR AND LEAST COMMON MULTIPLE 9

Numbers and their basic classification – Types of number – Basic operations of numbers – Progression – Tests of divisibility – Highest common factor – Least common multiple

UNIT II DECIMAL FRACTION AND PROBLEMS BASED ON AGES 9

Decimal fraction – Types of fraction – Comparison of fractions – Inserting fractions in between two given fractions – Relation between decimal fraction and normal fraction – Conversion of a decimal fraction into a vulgar fraction – Types of decimals – Conversion of mixed recurring decimal into a vulgar fraction – Standard form of decimal – Problems based on ages.

UNIT III TIME, WORK, DISTANCE, CALENDER AND CLOCK 9

General rule for time and work – General rule for work and wages – Speed – Unit of speed – Average speed – Some useful relations – Problems on Trains – Calendars and clocks – Odd days – Ordinary year – Leap year.

UNIT IV SIMPLE INTEREST, COMPOUND INTEREST AND ELEMENTARY ALGEBRA 9

Simple interest – Compound interest – Some useful relations – Difference between compound interest and simple interest – Short cut methods to solve special types of problems – Elementary Algebra and averages

UNIT V POLYNOMIAL AND QUADRATIC EQUATION 9

Polynomial introduction – Degree of a polynomial – Types of polynomial – Operations on polynomial – Remainder and factor theorem – Quadratic equation – Pure Quadratic equation – Discriminant – Roots of the Quadratic equations – Solution of Quadratic equation – Framing of a Quadratic equation – Special types of roots.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply basic concepts and techniques highest common factor and least common multiple on numbers.
- Apply the concept of decimal fraction and problems on ages.
- Apply the concept of time, work, distance, calendar and clock.

- Develop proficiency in simple interest, compound interest and basic algebraic skills.
- Explain the concepts and properties of polynomial and quadratic equations.

TEXT BOOKS

1. Agarwal R.S., "Quantitative Aptitude", S. Chand & Company Ltd, New Delhi, 2012.
2. Dinesh Khattar, "Quantitative Aptitude for competitive examinations ", Pearson India Education Services Pvt. Ltd., New Delhi, 2019.

REFERENCES

1. Praveen R.V., "Quantitative Aptitude and Reasoning", PHI Learning Private Limited, Delhi, 2013.
2. Gupta P, "A unique Approach to Quantitative Aptitude ", Unique Publishers (I) Pvt. Ltd, New Delhi, 2017.

E-RESOURCES

1. https://youtube.com/playlist?list=RDQM5Xl256aOq24
2. https://youtu.be/KE7tQf9spPg

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SEMESTER III

23MAT303	**DISCRETE MATHEMATICS**	L T P C
	[Common to CSE, CSE (CS), IT and AI&DS]	3 1 0 4

OBJECTIVES

- To provide knowledge of logic and proofs.
- To explore generating functions, mathematical induction, and counting techniques.
- To introduce the basics of graph theory.
- To explain algebraic structures and their properties.
- To introduce the concepts of lattices and Boolean algebra.

UNIT I LOGIC AND PROOFS 9+3

Propositional logic – Propositional equivalences – Predicates and quantifiers – Nested quantifiers – Rules of inference – Introduction to proofs – Normal forms.

UNIT II INDUCTION AND COUNTING 9+3

Mathematical induction – Strong induction and well-ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Binomial coefficients – Generating functions – Inclusion and exclusion principle

UNIT III GRAPHS 9+3

Graphs and graph models – Graph terminology and special types of graphs – Representing Graphs and Graph Isomorphism – Euler and Hamilton paths – Trees: Introduction to Trees.

UNIT IV ALGEBRAIC STRUCTURES 9+3

Algebraic systems – Semi groups and monoids – Groups: Definitions and examples – Subgroups and homeomorphisms – Cosets and Lagrange's theorem – Normal subgroups – Definitions and examples of Rings and Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA 9+3

Lattices as partially ordered sets: Definitions and examples – Some properties of lattices – Lattices as algebraic systems – Sub lattices, direct product and homomorphism – Some special lattices – Boolean algebra.

TOTAL: **45+15**

PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Analyze the concept of logic and proofs.
- Apply the concepts of generating functions, induction and counting techniques.
- Use the applications of graph theory.
- Identify the concepts and properties of algebraic structures.
- Compute the real-time applications using lattices.

TEXTBOOKS:

1. Kenneth H Rosen, "Discrete Mathematics and its Applications", Seventh Edition, McGraw Hill Education (India) Private Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, Thirty Reprints, 2011.

REFERENCES:

1. Ralph P Grimaldi and B.V Ramana., "Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education limited, 2014.
2. Satinder Bal Gupta., "Discrete Mathematics and structures", University science press, New Delhi, Fifth Edition, 2008.

E-RESOURCES

1. https://nptel.ac.in/courses/106106183 (Discrete Mathematics)
2. https://nptel.ac.in/courses/106108227 (Discrete Mathematics)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	1	-	-	-	-	-	1	-	-	-	-
2	3	3	2	1	-	-	-	-	-	1	-	-	-	-
3	3	3	2	1	-	-	-	-	-	1	-	-	-	-
4	3	3	2	1	-	-	-	-	-	1	-	-	-	-
5	3	3	2	1	-	-	-	-	-	1	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	3	2	1	-	-	-	-	-	1	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23ECT302 DIGITAL PRINCIPLES AND COMPUTER ARCHITECTURE L T P C

3 0 0 3

OBJECTIVES

- To introduce the fundamentals of digital circuits and simplification methods.
- To discuss about various combinational digital circuits using logic gates.
- To examine the design procedures for synchronous and asynchronous sequential circuits.
- To gain knowledge on addressing modes, instructions and its operations.
- To summarize the memory hierarchies, cache memories and bus architecture.

UNIT I INTRODUCTION TO DIGITAL CIRCUITS 9

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization.

UNIT II COMBINATIONAL CIRCUITS 9

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.

UNIT III SEQUENTIAL CIRCUITS 9

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of synchronous & asynchronous circuits – Design Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

UNIT IV COMPUTER ARCHITECTURE AND REGISTERS 9

Basics of a computer system: Evolution, Ideas, Technology, Performance, Power wall, Uniprocessors to Multiprocessors. Addressing and addressing modes. Instructions: Operations and Operands, Representing instructions, Logical operations, control operations.

UNIT V MEMORY AND I/O ORGANIZATION 9

Memory hierarchy, Memory Chip Organization, Cache memory, Virtual memory. Parallel Bus Architectures, Internal Communication Methodologies, Serial Bus Architectures, Mass storage, Input and Output Devices.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Apply the different methods used for simplification of Boolean expressions.
- Design various combinational digital circuits using logic gates.
- Analyze synchronous and asynchronous sequential circuits.
- Examine the addressing modes and instructions used in computer.
- Develop the memory design and bus architectures.

TEXT BOOKS

1. M. Morris R. Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2017.
2. David Harris ,"Digital Design and Computer Architecture", Morgan Kaufmann,2012.

REFERENCES

1. G. K. Kharate, "Digital Electronics", Oxford University Press, 2010
2. John F. Wakerly, "Digital Design Principles and Practices", Fifth Edition, Pearson Education, 2017.

E-RESOURCES

1. https://nptel.ac.in/courses/117/106/117106086/ (Digital Design)
2. https://nptel.ac.in/courses/108/105/108105132/ (Integrated Circuits)
3. https://onlinecourses.nptel.ac.in/noc24_cs83/ (Computer Architecture)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	2	2	2	-	-	-	-	3	3	3	3
2	3	2	2	3	2	2	-	-	-	-	2	1	2	3
3	3	3	3	2	1	2	-	-	-	-	2	2	3	2
4	3	2	2	3	2	2	-	-	-	-	3	2	2	3
5	3	2	3	2	2	1	-	-	-	-	2	2	3	3
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	2	2	2	2	2	-	-	-	-	2	2	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23ADT302	PROGRAMMING USING JAVA	L T P C
		3 0 0 3

OBJECTIVES

- To introduce the fundamental concepts of Object-Oriented Programming and the Java programming language.
- To familiarize students with classes, inheritance, packages, interfaces, and exception handling in Java.
- To enable students to develop Java applications using file handling, event handling, and Swing.
- To enhance students' knowledge of collections, strings, generics, multithreading, and their applications in Java programming.
- To foster the ability to develop Java applications using database connectivity and event handling mechanisms to solve real-world problems.

UNIT I 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- Java Doc comments

Coding Exercises:

1. Write Java classes with data members, constructors, methods, static members, and apply access specifiers.
2. Use Java data types, arrays, operators, control statements in small programs.
3. Write JavaDoc comments for classes and methods.

Problem-Solving Assignments:

1. Design classes like Dog, Rectangle, Circle with attributes and methods.
2. Implement simple calculators and object management classes.

UNIT II 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 – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces

Coding Exercises:

1. Demonstrate method overloading, passing and returning objects.
2. Build class hierarchies showing inheritance, method overriding, use of super.
3. Implement static, nested, and inner classes.

Problem-Solving Assignments:

1. Build real-world hierarchies e.g. Employee-Manager with inheritance.
2. Create package-based projects with interfaces.

UNIT III EXCEPTION HANDLING 9

Exception fundamentals – uncaught exception – exception types – exception hierarchy- using try and catch

– multiple catch blocks – throw, throws, finally – user defined exception

Coding Exercises:

1. Implement try-catch blocks, multiple catch, throw and throws in programs.
2. Use finally and create user-defined exceptions.

Problem-Solving Assignments:

1. Write applications with exception handling for common errors.

UNIT IV STRING HANDLING AND IO STREAMING **9**

String Constructors - String concatenation with other data types – Character Extraction Methods – String Comparison - Modifying a String – Searching String – StringBuffer – Wrapper Classes(Integer, Float, Double, Number, Character, Boolean) - Character Streams and Byte Streams – Reading and Writing Characters and Strings – Reading and Writing Files

Coding Exercises:

1. Manipulate strings using various string methods.
2. Use StringBuffer and wrapper classes.
3. Write programs reading/writing files using character and byte streams.

Problem-Solving Assignments:

1. Develop programs for string data processing and file handling projects.

UNIT V EVENT HANDLING **9**

The Delegation Event Model – Event Classes – Event Listener Interfaces - Layout Managers (Flow, Border, Grid and GridBagLayouts) - Handling Mouse Events - Introduction to Swing – JFrame, JTextField, JButton, JTextArea, JComboBox, JTahhedPane, JScrollPane

Coding Exercises:

1. Create Swing GUI applications using JFrame, JButton, JTextField, JTextArea, JComboBox etc.
2. Handle events with listeners and implement layout managers (Flow, Border, Grid, GridBag).

Problem-Solving Assignments:

1. Build interactive GUI apps such as login forms, calculators, and event-driven controls.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Apply the concepts of classes and objects to solve simple problems
- Develop programs using inheritance, packages and interfaces
- Apply the use of exception handling mechanisms and multithreaded model to solve real world problems
- Analyze Java applications with I/O packages, string classes, Collections and generics concepts
- Design the concepts of event handling and JavaFX components and controls for developing GUI based applications

TEXT BOOKS

1. Herbert Schildt, "Java: The Complete Reference", McGraw Hill Education ,Eleventh Edition, 2019
2. Herbert Schildt, "Introducing JavaFX 8 Programming", McGraw Hill Education, First Edition, 2015

REFERENCES

1. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, Prentice Hall , Eleventh Edition, 2018
2. ReemaTherja,"Programming in C",Oxford University Press, Second Edition, 2016.

E-RESOURCES

1. https://nptel.ac.in/courses/106/105/106105191/ (Programming in Java)
2. https://nptel.ac.in/courses/106/105/106105191/ (Inheritance)

Mapping of COs-POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	-	-	-	-	-	-	2	2	3	2
CO2	3	3	3	2	2	-	-	-	-	-	2	2	3	3
CO3	3	3	3	3	2	-	-	-	-	-	2	2	3	3
CO4	3	2	3	3	3	-	-	-	-	-	2	2	3	3
CO5	3	3	3	2	3	-	-	-	-	-	2	2	3	3
AVG	3	2.6	2.8	2.2	2	-	-	-	-	-	2	2	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23GEE301 **PROBLEM SOLVING AND PYTHON PROGRAMMING** L T P C
3 0 2 4

OBJECTIVES

- To impart the fundamentals of computational thinking, algorithm design, and problem-solving techniques for developing efficient software solutions.
- To develop students proficiency in Python programming using data types, expressions, operators, statements, and debugging techniques.
- To enable students to apply control structures, functions, recursion, and string manipulation for solving computational problems.
- To train students to use lists, tuples, dictionaries, and advanced data processing techniques for structured programming.
- To inculcate the knowledge of file handling, exception handling, modules, packages, and data visualization for developing robust Python applications.
- To develop the students in analytical, programming, and computational skills through coding practices, and to solve real-world problems using Python.
- omputational skills through coding practices, and to solve real-world problems using Python.

UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocksofalgorithms(statements,state,controlflow,functions),notation(pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

Coding Exercises:

1. Write a Python program to find the minimum element in a list using iteration.
2. Implement a function to insert an integer into a sorted list at the correct position.
3. Write a recursive program to solve the Towers of Hanoi puzzle for n disks.

Problem-solving Assignments:

1. Develop a Python program to guess an integer within a given range using binary search.
2. Write a program that implements algorithmic problem solving strategies and prints the sum of digits of a number recursively

UNIT II DATA TYPES, EXPRESSIONS, STATEMENTS 9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

Coding Exercises:

1. Write a program to exchange the values of two variables.
2. Implement a program to circulate the values of n variables.
3. Calculate the distance between two points given their coordinates.

Problem-solving Assignments:

1. Create a program to convert temperatures between Celsius and Fahrenheit.
2. Write a program to compute the area and perimeter of basic shapes using variables and expressions.

UNIT III CONTROL FLOW, FUNCTIONS, STRINGS 9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else),chained conditional (if-elif-else);Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

Coding Exercises:

1. Write a function that returns the square root of a number using the Newton-Raphson method.
2. Implement a function to compute the Greatest Common Divisor (GCD) of two numbers using recursion.
3. Write programs for linear and binary search on arrays.

Problem-solving Assignments:

1. Develop a program to sum an array of numbers using recursion.
2. Write a program that computes exponentiation using recursive functions.

UNIT IV LISTS, TUPLES, DICTIONARIES 9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations andmethods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation

Coding Exercises:

1. Write a program using list comprehensions to generate a list of squares of integers.
2. Implement a histogram function that counts the frequency of characters in a string.
3. Use dictionaries to implement a simple phonebook application.

Problem-solving Assignments:

1. Write a program to prepare a retail bill with item prices and quantities using dictionaries and lists.
2. Develop a student marks management system that stores data in dictionaries and supports basic queries.

UNIT V FILES, MODULES, PACKAGES& DATA VISUALIZATION 9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file -

Importing Matplotlib – Introduction to plotting – visualizing errors – density and contour plots – Histograms.

Coding Exercises:

1. Write a Python program to read from a text file and count the number of words.
2. Implement a program to copy the content of one file to another using file handling.

Problem-solving Assignments:

1. Create a module with functions and import it into a program to perform mathematical calculations.
2. Use Matplotlib to plot a histogram and a density plot from a given dataset.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, 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.Implementation of real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)

5. Implementation of real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets &Dictionaries)

6. Implementation of programs using Functions.(Factorial,largest number in a list,area of shape)

7. Implementation of programs using Strings.(reverse,palindrome,charecter count,replacingcharacters)

8.Implemenation of programs using written modules and Python Standard Libraries(p and as, numpy. Matplotlib, scipy)

9. Implementation of real-time/technical applications using File handling.(copy from one file to another, word count, longest word)

10. Implementation of real-time/technical applications using Exception handling.(divide by zero error, voter's age validity, student mark range validation)

TOTAL:45+15= 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Analyze computational problems to develop effective problem-solving strategies.
- Apply python constructs to develop programs for python applications.
- Apply control structures and functions to solve computational problems.
- Apply Python built-in data structures such as lists, tuples, and dictionaries to process and manipulate data efficiently.
- Analyze the operations of file handling, exception handling, modules, packages, and data visualization techniques for real-world applications.

- Implement python programs for solving various computational problems.

TEXT BOOKS

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", O'Reilly Publishers , ,Second Edition, , 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", BCS Learning & Development Limited ,First Edition, 2017.

REFERENCES

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, First Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", Notion Press ,First Edition , 2021.

E-RESOURCES

1. https://nptel.ac.in/courses/106104074(Introduction to Algorithms)
2. https://archive.nptel.ac.in/courses/106/106/106106182/ (Joy of Computing)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	2	–	–	1	1	1	–	2	3	3
2	3	3	3	2	3	–	–	1	1	1	–	2	3	3
3	3	3	3	2	3	–	–	1	1	1	–	2	3	3
4	3	3	3	2	3	–	1	1	1	1	–	3	3	3
5	3	3	3	3	3	1	1	2	2	2	–	3	3	3
6	3	3	3	3	3	1	1	2	3	2	2	3	3	3
AVG	3.00	3.00	3.00	2.33	2.83	1.00	1.00	1.33	1.50	1.33	2.00	2.50	3.00	3.00

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23ADE301 **FOUNDATIONS OF ARTIFICIAL INTELLIGENCE** L T P C

3 0 2 4

OBJECTIVES

- To impart the knowledge on AI and Intelligent systems.
- To familiarize the students on problem solving methods in AI
- To foster the knowledge on game playing and constraint satisfaction problems.
- To train the students on designing software agents.
- To inculcate the knowledge on AI technologies and its application.
- To implement AI techniques for solving real-world problems.

UNIT I INTELLIGENT AGENTS 9

Introduction to AI – Agents and Environments – concept of rationality – nature of environments – structure of agents. Problem solving agents – search algorithms – uninformed search strategies.

Coding Exercises:

1. Implement a simple problem-solving agent that navigates a maze to reach a goal.
2. Write a program simulating an agent performing uninformed search strategies (e.g., breadth-first search) in a graph.
3. Create functions to represent an agent's state, possible actions, and goal test in a problem space.

Problem-solving Assignments:

1. Design and simulate an AI agent that performs rational actions in a partially observable environment.
2. Develop an agent that uses state space representation to solve a simple puzzle like the 8-puzzle or water jug problem.

UNIT II PROBLEM SOLVING 9

Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments

Coding Exercises:

1. Implement a heuristic search algorithm such as greedy best-first search on a sample problem.
2. Write local search algorithms (e.g., hill climbing) to optimize a simple function.
3. Create an online search agent that adapts to unknown environments using feedback.

Problem-solving Assignments:

1. Solve a problem involving search with non-deterministic actions using appropriate heuristics.
2. Design an optimization algorithm using local search to find the minimum of a function.

UNIT III GAME PLAYING AND CSP 9

Game theory – optimal decisions in games – alpha-beta search – monte -carlo tree search – stochastic games . Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local

search for CSP – structure of CSP.

Coding Exercises:

1. Implement alpha-beta pruning for a two-player game tree.
2. Write a Monte Carlo tree search simulation for a simple game.
3. Solve a constraint satisfaction problem using backtracking search.

Problem-solving Assignments:

1. Design a program to solve Sudoku using constraint propagation and local search.
2. Implement a stochastic game simulation and analyze optimal decisions.

UNIT IV LOGICAL REASONING 9

Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – forward chaining – backward chaining – resolution.

Coding Exercises:

1. Create a knowledge-based agent that uses propositional logic for reasoning.
2. Implement forward and backward chaining algorithms for inference in logic.
3. Write a program demonstrating propositional model checking.

Problem-solving Assignments:

1. Develop a program for resolution-based theorem proving on given logical formulas.
2. Design a knowledge representation system using first-order logic syntax and semantics.

UNIT V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot.

Coding Exercises:

1. Implement a simple Natural Language Processing task like tokenization and sentence segmentation.
2. Write a basic program for information retrieval using keyword searching.
3. Develop a speech recognition simulation using pattern matching.

Problem-solving Assignments:

1. Create a machine translation system for a limited vocabulary and grammar rules.
2. Design and simulate a basic robot environment with perception and action capabilities.

LIST OF EXPERIMENTS

(Any Eight Experiments to be conducted)

1. Implement basic search strategies – 8-Puzzle, 8 - Queens problem, Cryptarithmetic.
2. Implement A* and memory bounded A* algorithms
3. Implement Minimax algorithm for game playing (Alpha-Beta pruning)
4. Solve constraint satisfaction problems
5. Implement propositional model checking algorithms

6. Implement forward chaining, backward chaining, and resolution strategies
7. Build naïve Bayes models
8. Implement Bayesian networks and perform inferences
9. Mini-Project

TOTAL : 45 + 15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Develop uninformed search strategies to solve state-space search problems..
- Explain the principles of game theory and optimal decision-making in AI.
- Analyze local search methods for solving complex constraint satisfaction problems.
- Apply propositional and first-order logic inference techniques, including forward chaining, backward chaining, and resolution.
- Analyze real-world AI applications and evaluate their impact across different domains.
- Implement AI techniques for language processing, machine translation, speech recognition, and robotics applications.

TEXT BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Fourth Edition, 2020.
2. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)", Jones and Bartlett Publishers, Inc. First Edition, 2008.

REFERENCES

1. Gerhard Weiss, "Multi Agent Systems", MIT Press, Second Edition, , 2013.
2. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, First Edition, 2010.

E-RESOURCES

1. https://nptel.ac.in/courses/106/105/106105077 (Uninformed Search)
2. https://nptel.ac.in/courses/106/106/106106126 (Propositional and First Order Logic)

Mapping of COs-POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	1	1	1	1	1	2	2	3	2
CO2	3	3	3	3	3	1	1	2	2	2	2	2	3	3
CO3	3	3	3	3	3	1	1	2	2	2	3	3	3	3
CO4	3	3	3	3	3	2	1	1	2	3	3	3	3	3
CO5	3	3	3	3	3	2	1	1	3	3	3	3	3	3
CO6	3	3	3	3	3	3	2	1	3	3	3	3	3	3
AVG	3	3	3	3	3	1.6	1.1	1.3	2.1	2.3	2.6	2.6	3	2.8

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23ADE302 **DATA STRUCTURES DESIGN** L T P C

3 0 2 4

OBJECTIVES

- To introduce the concepts of Abstract Data Types (ADTs).
- To familiarize students with linear and non-linear data structures using Python.
- To enhance students' understanding of sorting and searching algorithms.
- To foster problem-solving skills through the implementation of data structures.
- To impart knowledge in representing and traversing graph structures.
- To develop students' skills in implementing, analyzing, and applying data structures such as lists, stacks, queues, trees, and graphs using Python.

UNIT I ABSTRACT DATA TYPES 9

Abstract Data Types (Adts) – ADT And Classes – Introduction To OOP – Classes In Python – Inheritance – Namespaces – Shallow And Deep Copying Introduction To Analysis of Algorithms – Asymptotic Notations – Divide & Conquer – Recursion – Analyzing Recursive Algorithms.

Coding Exercises:

1. Implement a Python class representing an abstract stack with push, pop, and is_empty methods.
2. Write recursive functions and analyze their time complexity using asymptotic notation.
3. Create examples demonstrating shallow vs deep copying of Python objects.

Problem-solving Assignments:

1. Design and implement a class hierarchy using inheritance to represent different types of abstract data types.
2. Analyze and compare the efficiency of a recursive vs iterative algorithm for the Fibonacci series.

UNIT II LINEAR STRUCTURES 9

List ADT – array-based implementations – linked list implementations – singly linked lists – doubly linked lists – Stack ADT – Queue ADT – double ended queues – applications

Coding Exercises:

1. Implement singly and doubly linked lists with insert, delete, and traverse operations.
2. Write Python programs for stack and queue ADTs and demonstrate typical applications.
3. Implement a double-ended queue (deque) and show enqueue and dequeue from both ends.

Problem-solving Assignments:

1. Create a Python program to reverse a linked list and detect cycles in the list.
2. Use stack ADT to check for balanced parentheses in an expression.

UNIT III SORTING AND SEARCHING 9

Bubble sort – selection sort – insertion sort – merge sort – quick sort – analysis of sorting algorithms– linear search – binary search

Coding Exercises:

1. Implement bubble sort, selection sort, and insertion sort for a list of elements.
2. Write Python programs for merge sort and quick sort algorithms.
3. Implement linear and binary search algorithms.

Problem-solving Assignments:

1. Analyze and compare the time complexities of sorting algorithms with different input sizes.
2. Develop a program to find the kth smallest element in an unsorted array using sorting and searching techniques.

UNIT IV TREE STRUCTURES 9

Tree ADT – Binary Tree ADT – tree traversals – binary search trees – AVL trees – heaps – multi- way search trees

Coding Exercises:

1. Implement binary tree with inorder, preorder, and postorder traversals.
2. Write Python programs to insert, delete, and search elements in a binary search tree.
3. Implement AVL tree rotations and balancing operations.

Problem-solving Assignments:

1. Design a program that converts an unbalanced BST into a balanced AVL tree.
2. Implement a heap and demonstrate heap sort on a dataset.

UNIT V GRAPH STRUCTURES 9

Graph ADT – representations of graph – graph traversals – DAG – topological ordering – greedy algorithms – dynamic programming – shortest paths – minimum spanning trees – introduction to complexity classes and intractability

Coding Exercises:

1. Represent a graph using adjacency matrix and adjacency list, and implement graph traversals (DFS and BFS).
2. Write Python programs to implement topological sorting for a directed acyclic graph.
3. Implement Dijkstra's algorithm for shortest path in a weighted graph.

Problem-solving Assignments:

1. Develop a program to find the minimum spanning tree of a graph using Prim's or Kruskal's algorithm.
2. Create a dynamic programming solution for the shortest path problem in a grid.

LIST OF EXPERIMENTS

1. Implement simple ADTs as Python classes
2. Implement recursive algorithms in Python
3. Implement List ADT using Python arrays
4. Linked list implementations of List

5. Implement The Stack And Queue Adt
6. Applications of List, Stack and Queue ADTs
7. Implementation of sorting and searching algorithms
8. Tree representation and traversal algorithms
9. Implementation of Binary Search Trees
10. Graph representation and Traversal algorithmsA

TOTAL : 45 + 15 = 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the concepts of abstract data types and their role in organizing and managing data efficiently.
- Apply linear data structures, including stacks and queues, to solve computational problems.
- Apply searching and sorting algorithms and evaluate their performance using appropriate complexity measures.
- Analyze tree structures and algorithms for efficient data organization and retrieval.
- Analysis graph structure and traversal techniques for real-world problems.
- Develope Python-based data structures such as lists, stacks, queues, trees, and graphs to solve computational problems.

TEXTBOOKS

1) Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, "Data Structures & Algorithms in Python", An Indian Adaptation, John Wiley & Sons Inc., 2021

2. Kamthane, "Introduction to Data Structures in C", Pearson Education ,first Edition, 2007.

REFERENCES

1) Lee, Kent D., Hubbard, Steve, "Data Structures and Algorithms with Python" Springer Edition 2015

2) Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011

E-RESOURCES

1) https://nptel.ac.in/courses/110106072 (stack)
2) https://nptel.ac.in/courses/110106073(queue)

Mapping of COs-POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	1	1	1	1	2	2	3	3
CO2	3	3	3	3	2	1	1	2	2	2	2	2	3	3
CO3	3	3	3	3	2	1	1	2	2	2	3	3	3	3
CO4	3	3	3	3	2	2	1	1	2	3	3	3	3	3
CO5	3	3	3	3	3	2	1	3	3	3	3	3	3	3
CO6	3	3	3	3	3	3	1	3	3	3	3	3	3	3
AVG	3	3	2.8	2.8	2.1	1.6	1	2	2.1	2.3	2.6	2.6	3	3

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23EEC301 **PROFESSIONAL DEVELOPMENT** L T P C
0 0 2 1

OBJECTIVES

To be proficient in important Microsoft Office tools: MS WORD, EXCEL and POWERPOINT.

- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered.
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD: **10 Hours**

Create and format a document
Working with tables
Working with Bullets and Lists
Working with styles, shapes, smart art, charts
Inserting objects, charts and importing objects from other office tools
Creating and Using document templates
Inserting equations, symbols and special characters
Working with Table of contents and References, citations
Insert and review comments
Create bookmarks, hyperlinks, endnotes footnote
Viewing document in different modes
Working with document protection and security
Inspect document for accessibility

MS EXCEL: **10 Hours**

Create worksheets, insert and format data
Work with different types of data: text, currency, date, numeric etc.
Split, validate, consolidate and Convert data
Sort and filter data
Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc,)
Work with Lookup and reference formulae
Create and Work with different types of charts

Use pivot tables to summarize and analyze data

Perform data analysis using own formulae and functions

Combine data from multiple worksheets using own formulae and built-in functions to generate results

Export data and sheets to other file formats

Working with macros

Protecting data and Securing the workbook

MS POWERPOINT: **10 Hours**

Select slide templates, layout and themes

Formatting slide content and using bullets and numbering

Insert and format images, smart art, tables, charts

Using Slide master, notes and handout master

Working with animation and transitions

Organize and Group slides

Import or create and use media objects: audio, video, animation

Perform slideshow recording and Record narration and create presentable videos

TOTAL: 30 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to,

- Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements.
- Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding.
- Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

Chairman - BoS

SEMESTER - IV

23ADT401 ADVANCED NETWORKING AND PROTOCOL L T P C

3 0 0 3

OBJECTIVES

- To familiarize the concepts, functions, and standards of the Physical and Data Link Layers in computer networks.
- To impart knowledge on network techniques, and Network Layer protocols used for data communication.
- To inclucate routing algorithms and routing protocols used to determine efficient network paths.
- To foster knowledge of Transport Layer protocols for reliable end-to-end data communication.
- To familiarize with Application Layer protocol and services.

UNIT I DATA LINK AND PHYSICAL LAYERS 9

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance – Transmission media- Switching – Circuit Switching

Coding Exercises:

1. Implement a Python program to simulate framing techniques (byte stuffing, bit stuffing) for data transmission.
2. Write a program demonstrating CSMA/CD protocol collision detection and resolution.
3. Create a simulator for error detection using CRC (Cyclic Redundancy Check) with polynomial division.

Problem-solving Assignments:

1. Design a flow control mechanism using sliding window protocol with Go-Back-N error recovery.
2. Analyze and implement Ethernet frame format parsing and VLAN tagging for 802.1Q frames.

UNIT II NETWORK LAYER 9

Switching: Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP, RARP, ICMP, DHCP

Coding Exercises:

1. Implement IPv4 address subnetting calculator with CIDR notation support.
2. Write Python programs for ARP table management and ARP request/response packet simulation.
3. Create an ICMP ping implementation simulator with echo request/reply handling.

Problem-solving Assignments:

1. Design and implement IPv6 address conversion tools (hex to dotted decimal) and prefix calculation.
2. Simulate DHCP client-server interaction including IP address assignment and lease management.

UNIT III ROUTING 9

Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF – Path-vector routing - BGP - Multicast Routing: DVMRP – PIM

Coding Exercises:

1. Implement Distance Vector Routing algorithm (RIP) with routing table updates and convergence simulation.
2. Write a program for Link State Routing (OSPF) using Dijkstra's algorithm for shortest path computation.
3. Create a BGP path-vector routing simulator showing route advertisement and selection.

Problem-solving Assignments:

1. Design a multicast routing simulator implementing DVMRP with reverse path forwarding.
2. Analyze and implement PIM (Protocol Independent Multicast) sparse mode join/prune messages.

UNIT IV TRANSPORT LAYER 9

Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DECbit, RED) – SCTP – Quality of Service

Coding Exercises:

1. Implement TCP three-way handshake and connection termination (four-way handshake) simulation.
2. Write a congestion control simulator demonstrating slow start, congestion avoidance, and fast recovery.
3. Create UDP packet simulator with checksum calculation and reliability enhancement using timers.

Problem-solving Assignments:

1. Design an SCTP (Stream Control Transmission Protocol) multi-homing and multi-streaming demonstration.
2. Implement Quality of Service (QoS) mechanisms like traffic shaping and leaky bucket algorithm.

UNIT V INTRODUCTION AND APPLICATION LAYER 9

Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Introduction to Sockets - Application Layer protocols: HTTP – FTP – Email protocols (SMTP - POP3 - IMAP - MIME) – DNS – SNMP

Coding Exercises:

1. Create socket programming examples for TCP client-server communication and file transfer.
2. Implement HTTP request parser and simple web server responding to GET/POST requests.
3. Write DNS query simulator resolving domain names to IP addresses using UDP sockets.

Problem-solving Assignments:

1. Design an email client simulator implementing SMTP for sending and POP3/IMAP for receiving emails.
2. Create SNMP agent simulation with MIB (Management Information Base) walk and set operations.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain the concepts and functions of data link and physical layers.
- Explain the mastery of IPV4,IPV6,Subnetting and key network layer protocols.
- Analysis different routing protocols such as RIP,OSPF and BGP.
- Analyze transport layer protocols including TCP,UDP and SCTP.
- Explain the functions of application layer protocols such as HTTP,FTP,and DNS.

TEXT BOOKS

1. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education ,Eighth Edition, 2021.
2. Behrouz A. Forouzan, "Data Communications and Networking with TCP/IP Protocol Suite", TMH ,Sixth Edition, 2022.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie," Computer Networks: A Systems Approach", Morgan Kaufmann Publishers Inc., Fifth Edition, 2012.
2. William Stallings, "Data and Computer Communications", Pearson Education Tenth Edition, 2013

E-RESOURCES

1. https://nptel.ac.in/courses/106/106/106106091/ (Introduction to Computer Networks
2. https://nptel.ac.in/courses/106/105/106105082/ (Computer Networks)

Mapping of COs-POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	3	2	-	-	-	-	-	2	2
CO2	3	3	2	2	3	2	-	-	-	-	-	3	2
CO3	3	3	2	2	3	2	-	-	-	-	-	3	2
CO4	3	3	2	2	3	2	-	-	-	-	-	3	2
CO5	3	3	2	2	3	2	1	1	3	2	3	3	3
AVG	3	3	1.8	2	3	2	0.2	0.2	0.6	0.4	0.6	2.8	2

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23ITT401 **OBJECT ORIENTED SOFTWARE DESIGN** L T P C

3 0 0 3

OBJECTIVES

- To familiarize students with the concepts and life cycle models of software development.
- To train students in Software Requirement Specification and Use case model.
- To develop skills in software design, testing techniques, maintenance, and reengineering.
- To impart knowledge on Unified Process, use cases, and UML diagrams..
- To aquire knowledge on GRASP, software quality assurance, and object-oriented testing practices.

UNIT I INTRODUCTION 9

Software engineering concepts – Development activities – Software lifecycle models - Classical waterfall - Iterative waterfall – Prototyping – Evolutionary - Spiral – Software project management – Project planning – Estimation – Scheduling – Risk management – Software configuration management

Coding Exercises:

1. Implement a Python program to simulate the Classical Waterfall model phases for a simple project.
2. Create a project scheduling tool using PERT/CPM algorithms to calculate critical path.
3. Write a configuration management system using Git commands to track software versions.

Problem-solving Assignments:

1. Develop a risk management tool that identifies, prioritizes, and tracks project risks with mitigation strategies.
2. Design an estimation model comparing COCOMO and Function Point Analysis for a sample project.

UNIT II SOFTWARE REQUIREMENT SPECIFICATION 9

Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – Object modeling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modeling – Data Flow Diagram.

Coding Exercises:

1. Create a Python program to generate UML Use Case diagrams from textual requirements.
2. Implement a Finite State Machine simulator for system behavior modeling.
3. Write a DFD (Data Flow Diagram) generator that parses process specifications into visual diagrams.

Problem-solving Assignments:

1. Develop a complete SRS document for a Library Management System using UML diagrams.
2. Design a Petri Net model for a banking transaction system and simulate its execution.

UNIT III DESIGN, TESTING & MAINTENANCE 9

Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence –

Design patterns –Testing – Unit testing – Black box testing– White box testing – Integration and System testing– Regression testing – Debugging - Program analysis – Symbolic execution – Model Checking-Maintenance and Reengineering-BPR model Reengineering process model-Reverse and Forward Engineering.

Coding Exercises:

1. Implement unit testing framework using JUnit/Pytest for a sample banking application.
2. Create a code coverage tool that measures statement, branch, and path coverage.
3. Write a symbolic execution engine for simple arithmetic expressions.

Problem-solving Assignments:

1. Design and implement black box and white box test cases for an e-commerce checkout module.
2. Develop a reengineering tool that converts procedural code to object-oriented design using BPR model.

UNIT IV UNIFIED PROCESS AND USE CASE DIAGRAMS 9

Introduction to OOAD with OO Basics - Unified Process - UML diagrams - Use Case - Case study - the Next Gen POS system, Inception -Use case Modeling - Relating Use cases - include, extend and generalization - When to use Use-cases - Class Diagram- Aggregation and Composition - Relationship between sequence diagrams and use cases

Coding Exercises:

1. Implement a Use Case modeling tool supporting include, extend, and generalization relationships.
2. Create a sequence diagram generator from use case scenarios using PlantUML.
3. Write a class diagram validator checking aggregation, composition, and association rules.

Problem-solving Assignments:

1. Apply Unified Process to develop inception phase artifacts for NextGen POS system.
2. Design complete UML diagrams (use case, class, sequence) for an online booking system.

UNIT V DESIGN PATTERNS & TESTING 9

GRASP: Designing objects with responsibilities - Creator - Information expert - Low Coupling - High Cohesion - Controller Design Patterns - creational - factory method - structural - Bridge - Adapter - behavioural - Strategy - observer - Applying GoF design patterns - Mapping design to code-object Oriented Methodologies - Software Quality Assurance - Impact of object orientation on Testing - Develop Test Cases and Test Plans

Coding Exercises:

1. Implement GRASP patterns (Creator, Information Expert, Low Coupling) in a sample inventory system.
2. Create Factory Method, Bridge, and Strategy design patterns for a graphics rendering application.
3. Develop Observer pattern for real-time stock price monitoring system.

Problem-solving Assignments:

1. Apply GoF design patterns to refactor a monolithic e-commerce system into modular architecture.
2. Create comprehensive test plans and test cases for an object-oriented banking application with 90% code coverage.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain software engineering concepts, development activities, and software lifecycle models..
- Design Software Requirement Specifications and develop use case models.
- Apply software design, testing, maintenance, and reengineering techniques.
- Apply the concept of Unified Process, use cases, and UML diagrams for software development.
- Analysis design pattern and testing practices.

TEXT BOOKS

1. Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Pearson Education ,Third Edition, 2005.
2. Bernd Bruegge, Alan H Dutoit, "Object-Oriented Software Engineering", Pearson Education, Second Edition, , 2004.
3. Len Bass, Ingo Weber and Liming Zhu," DevOps: A Software Architect's Perspective", Pearson Education, 2016

REFERENCES

1. Rajib Mall," Fundamentals of Software Engineering", PHI Learning Pvt. Ltd., Third edition, 2009.
2. Martin Fowler, "UML Distilled: A Brief Guide to the Standard Object Modeling Language", Addison Wesley, Third edition, 2003.

E-RESOURCES

1. https://nptel.ac.in/courses/106/105/106105182 (Software Models)
2. https://onlinecourses.nptel.ac.in/noc20_cs84/preview (OO models)

Mapping of COs-POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	3	3	3	2	2
CO2	3	1	1	3	1	-	-	1	2	1	3	3	2	3
CO3	3	1	2	1	1	-	-	2	1	1	3	3	1	1
CO4	3	1	3	1	-	-	-	2	1	2	1	1	2	2
CO5	3	1	1	2	2	-	-	3	1	2	3	3	2	1
AVG	3	1	1	2	2	-	-	3	1	2	3	3	2	1

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23CST301 OPERATING SYSTEMS L T P C

3 0 0 3

OBJECTIVES

- To familiarize students with the basic concepts and functions of operating systems.
- To enhance knowledge on CPU scheduling algorithms and process synchronization mechanisms.
- To impart understanding of memory management concepts including segmentation.
- To inculcate knowledge of storage management systems and file organization.
- To foster awareness on the fundamentals of virtual machines and mobile operating systems.

UNIT I 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

Coding Exercises:

1. Implement a simple system call simulator in Python that demonstrates user-kernel mode transitions.
2. Create a program simulating different OS structuring methods (monolithic kernel vs microkernel).
3. Write a shell program that demonstrates OS services like process creation, file operations, and system information.

Problem-solving Assignments:

1. Design and implement an OS bootstrap loader that initializes system services and user interface.
2. Develop a program comparing different OS evolution stages (batch, multiprogramming, time-sharing).

UNIT II 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 deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

Coding Exercises:

1. Implement CPU scheduling algorithms: FCFS, SJF, Priority, and Round Robin with Gantt charts.
2. Create a multi-threaded program demonstrating thread creation, synchronization using mutex/semaphore.
3. Simulate producer-consumer problem using semaphores and solve dining philosophers problem.

Problem-solving Assignments:

1. Design a deadlock detection and recovery system using Banker's algorithm for resource allocation.

2. Implement process synchronization for readers-writers problem with multiple readers allowed.

UNIT III 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.

Coding Exercises:

1. Implement paging simulator with page table management and TLB (Translation Lookaside Buffer).
2. Write page replacement algorithms: FIFO, LRU, Optimal with page fault calculations.
3. Create a memory allocation simulator for first-fit, best-fit, and worst-fit strategies.

Problem-solving Assignments:

1. Design a virtual memory manager handling demand paging, copy-on-write, and thrashing detection.
2. Implement segmentation with paging and demonstrate memory protection mechanisms.

UNIT IV 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 mounting – 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

Coding Exercises:

1. Implement disk scheduling algorithms: FCFS, SSTF, SCAN, C-SCAN, LOOK with seek time calculations.
2. Create a file system simulator with directory structure, file allocation (contiguous, linked, indexed).
3. Write a program demonstrating free space management using bitmaps and linked lists.

Problem-solving Assignments:

1. Design a complete file system implementation with mounting, sharing, and protection mechanisms.
2. Implement I/O subsystem with buffering, caching, and disk I/O optimization strategies.

UNIT V VIRTUAL MACHINES AND MOBILE OS 9

Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Mobile OS – iOS and Android

Coding Exercises:

1. Create a simple virtual machine simulator with memory isolation and process migration.
2. Implement Android/iOS app lifecycle management and inter-process communication simulation.
3. Write a hypervisor basic implementation demonstrating VM creation and resource allocation.

Problem-solving Assignments:

1. Design a mobile OS power management system optimizing battery life with app scheduling.
2. Develop a containerization system using namespaces and cgroups for process isolation.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Understand the fundamental structure, objectives and evolution of operating systems.
- Analyze process management concepts including scheduling, synchronization and deadlock handling mechanisms.
- Apply memory management techniques to optimize system performance.
- Examine storage management concepts including file systems, disk scheduling and I/O systems.
- Describe the principles of virtualization and features of iOS and Android operating systems.

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley and Sons Inc., Tenth Edition, 2018
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, Fifth Edition, 2022

REFERENCES

1. Ramaz Elmasri, A. Gil Carrick, David Levine, " Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010
2. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall, Seventh Edition, 2018.

E-RESOURCES

1. https://nptel.ac.in/courses/106105214(Operating system fundamentals)
2. https://nptel.ac.in/courses/106106144(Introduction to operating systems)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	–	2	–	–	–	–	1	–	2	3	2
2	3	3	2	2	3	–	–	1	1	1	–	2	3	3
3	3	3	3	2	3	–	–	1	1	1	–	3	3	3
4	3	3	3	2	3	–	–	1	1	1	–	3	3	3
5	3	2	2	1	3	1	1	1	1	2	–	3	3	3
6	–	–	–	–	–	–	–	–	–	–	–	–	–	–
AVG	3.00	2.60	2.20	1.75	2.80	1.00	1.00	1.00	1.00	1.20	–	2.60	3.00	2.80

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23ADE401 **DATA SCIENCE AND ANALYTICS** L T P C

(Lab Embedded Theory Course) 3 0 2 4

OBJECTIVES

- To teach the concepts on data retrieval, cleaning, transformation, and analysis processes.
- To impart knowledge normal distributions and regression models in data analysis.
- To foster inferential statistical methods for data-driven decision making.
- To familizer hypothesis testing techniques for statistical modeling.
- To acquire knowledge on statistical methods for decision making and predictive modeling.
- To explore data science methodologies to solve real-world problems.

UNIT I INTRODUCTION 9

Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications.

Coding Exercises:

1. Implement a complete data science pipeline using pandas: data retrieval, cleansing, transformation, and exploratory data analysis on a CSV dataset.
2. Write Python functions for data integration from multiple sources (CSV, JSON, API) and create summary statistics visualizations.
3. Develop a data preprocessing pipeline handling missing values, outliers, and feature scaling using scikit-learn.

Problem-solving Assignments:

1. Design an end-to-end data science project analyzing customer churn data from research goal setting to model deployment.
2. Create an exploratory data analysis dashboard for sales data using matplotlib/seaborn with key insights and recommendations.

UNIT II PROCESS MANAGEMENT 9

Normal distributions – z scores – normal curve problems – finding proportions – finding scores – more about z scores – 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 toward the mean .

Coding Exercises:

1. Implement z-score calculations and normal distribution probability computations using scipy.stats.
2. Write functions to compute Pearson correlation coefficient and create scatter plots with regression lines using numpy/matplotlib.
3. Develop multiple linear regression model using statsmodels and interpret R^2, standard error of estimate.

Problem-solving Assignments:

1. Analyze relationship between house prices and features (size, location, age) using correlation and regression analysis.
2. Create a prediction model for student performance based on study hours, attendance, and prior grades.

UNIT III INFERENTIAL STATISTICS 9

Populations – samples – random sampling – probability and statistics Sampling distribution – creating a sampling distribution – mean of all sample means – standard error of the mean – other sampling distributions Hypothesis testing – z-test – z-test procedure – statement of the problem – null hypothesis – alternate hypotheses – decision rule – calculations – decisions - interpretations.

Coding Exercises:

1. Simulate sampling distributions and calculate standard error of the mean for different sample sizes using numpy.
2. Implement z-test procedure with null/alternate hypotheses, p-values, and decision rules for population proportion testing.
3. Write functions for hypothesis testing on means with confidence intervals and power analysis.

Problem-solving Assignments:

1. Conduct A/B testing analysis for website conversion rates using z-test and interpret statistical significance.
2. Analyze survey data to test if average customer satisfaction differs significantly between product versions.

UNIT IV T-TEST 9

t-test for one sample – sampling distribution of t – t-test procedure – degrees of freedom – estimating the standard error – case studies t-test for two independent samples – statistical hypotheses – sampling distribution – test procedure – p-value – statistical significance – estimating effect size – t-test for two related samples

Coding Exercises:

1. Implement one-sample t-test and two-independent samples t-test using scipy.stats.ttest_1samp and ttest_ind.
2. Write functions calculating degrees of freedom, p-values, effect size (Cohen's d), and confidence intervals.
3. Develop paired t-test for before-after treatment analysis with data visualization.

Problem-solving Assignments:

1. Analyze drug efficacy study comparing treatment vs control group blood pressure readings using independent t-test.
2. Evaluate employee training program effectiveness using paired t-test on pre/post training performance scores.

UNIT V ANALYSIS OF VARIANCE **9**

F-test – ANOVA – estimating effect size – multiple comparisons – case studies Analysis of variance with repeated measures Two-factor experiments – three f-tests – two-factor ANOVA – other types of ANOVA Introduction to chi-square tests

Coding Exercises:

1. Implement one-way ANOVA and two-way ANOVA using scipy.stats.f_oneway and statsmodels.
2. Write functions for post-hoc multiple comparisons (Tukey HSD) and effect size calculations (eta-squared).
3. Develop chi-square test implementation for categorical data independence testing.

Problem-solving Assignments:

1. Analyze crop yield differences across multiple fertilizer treatments using one-way ANOVA with post-hoc analysis.
2. Conduct two-factor ANOVA studying effects of teaching method and student background on exam scores.

LIST OF EXPERIMENTS

Tools: Python, Numpy, Scipy, Matplotlib, Pandas, statmodels, seaborn, plotly, bokeh

1. Working with Numpy arrays
2. Working with Pandas data frames
3. Basic plots using Matplotlib
4. Frequency distributions, Averages, Variability
5. Normal curves
6. Correlation and scatter plots
7. Correlation coefficient
8. Regression
9. Z-test case study
10. T-test case studies

TOTAL: 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain data retrieval, cleaning, transformation, and analysis processes.
- Apply normal distributions and regression models for data analysis..

- Analysis inferential statistical methods for data-driven decision making.
- Apply hypothesis testing techniques for statistical modeling..
- Analysis statistical methods for decision-making and predictive modeling.
- Apply data science methodologies to solve real-world problems.

TEXT BOOKS

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (first two chapters for Unit I).
2. Robert S. Witte and John S. Witte, "Statistics", Wiley Publications, Eleventh Edition, 2017.

REFERENCES

1. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.
2. Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare, "Fundamentals of Data Science", CRC Press, 2022.

E-RESOURCES

1. https://nptel.ac.in/courses/108/105/106105219/ (Introduction data science)
2. https://nptel.ac.in/courses/108/102/106102132/ (time series)

Mapping of COs-POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	2	-	-	2	2	3	3	3	2
CO2	3	3	2	3	3	2	-	-	2	2	3	3	3	2
CO3	3	3	2	3	3	1	-	-	2	2	3	3	3	3
CO4	3	3	2	3	3	1	-	-	2	2	3	3	3	3
CO5	3	3	2	3	3	1	-	-	2	2	3	3	3	3
CO6	3	3	3	3	3	1	1	1	1	1	1	1	3	3
AVG	3	3	3	3	3	1.3	0.16	0.16	1.8	1.8	2.7	2.7	3	2.7

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

23ADE402	MACHINE LEARNING ESSENTIALS	L T P C
	(Lab Embedded Theory Course)	3 0 2 4

OBJECTIVES

- To impart fundamental concepts and principles of machine learning.
- To train students in supervised learning algorithms.
- To foster unsupervised learning and ensemble techniques for pattern discovery and prediction.

  To familiarize students with machine learning experimentation, cross-validation, performance evaluation, and statistical significance testing..
- To impart reinforcement learning concepts, algorithms, and learning strategies.
- To develop practical skills in implementing and evaluating machine learning algorithms using real-world datasets.

UNIT I MACHINE LEARNING BASICS **9**

Review of Linear Algebra for machine learning; Introduction and motivation for machine learning; Examples of machine learning applications, Vapnik-Chervonenkis (VC) dimension, Probably Approximately Correct (PAC) learning, Hypothesis spaces, Inductive bias, Generalization, Bias variance trade-off

Coding Exercises:

1. Implement matrix operations (dot product, transpose, inverse) using NumPy for linear algebra review.
2. Write functions to calculate VC dimension for simple hypothesis spaces and plot PAC learning curves.
3. Create visualizations demonstrating bias-variance tradeoff using polynomial regression models.

Problem-solving Assignments:

1. Analyze and visualize inductive bias effects on different hypothesis spaces using synthetic datasets.
2. Implement and compare generalization performance across varying training set sizes.

UNIT II SUPERVISED LEARNING **9**

Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Perceptron algorithm, Probabilistic discriminative model– Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random Forests

Coding Exercises:

1. Implement linear regression from scratch using gradient descent and compare with sklearn implementation.
2. Write Perceptron algorithm and Naive Bayes classifier for binary classification on Iris dataset.
3. Implement SVM with kernel trick (linear, RBF) using sklearn and visualize decision boundaries.

Problem-solving Assignments:

1. Build and compare Decision Tree vs Random Forest models for customer churn prediction.
2. Implement Bayesian linear regression with prior distributions and posterior inference.

UNIT III UNSUPERVISED LEARNING 9

Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.

Coding Exercises:

1. Implement K-means clustering from scratch and compare with sklearn on synthetic datasets.
2. Write KNN classifier with different distance metrics (Euclidean, Manhattan, Minkowski).
3. Implement Gaussian Mixture Model using EM algorithm and visualize clusters.

Problem-solving Assignments:

1. Compare ensemble methods: Bagging, Boosting (AdaBoost), Stacking on UCI datasets.
2. Design customer segmentation system using K-means + GMM on retail transaction data.

UNIT IV DESIGN AND ANALYSIS OF MACHINE LEARNING EXPERIMENTS 9

Guidelines for machine learning experiments, Cross Validation (CV) and resampling – K-fold CV, bootstrapping, measuring classifier performance, assessing a single classification algorithm and comparing two classification algorithms – *t* test, McNemar's test, K-fold CV paired *t* test

Coding Exercises:

1. Implement K-fold cross-validation, stratified K-fold, and bootstrap resampling techniques.
2. Write functions for classifier evaluation metrics (precision, recall, F1, ROC-AUC, confusion matrix).
3. Perform statistical tests: McNemar's test, paired t-test for comparing two classifiers.

Problem-solving Assignments:

1. Design complete ML experiment pipeline with hyperparameter tuning using GridSearchCV.
2. Analyze model performance across multiple datasets using proper statistical comparisons.

UNIT V REINFORCEMENT LEARNING 9

Introduction, Learning Task, Q Learning, Non deterministic Rewards and actions, temporal- difference learning, Relationship to Dynamic Programming, Active reinforcement learning, Generalization in reinforcement learning

Coding Exercises:

1. Implement Q-Learning algorithm for FrozenLake environment and visualize learning curves.
2. Write Temporal Difference (TD) learning for predicting state values in GridWorld.
3. Create simple multi-armed bandit problem with epsilon-greedy and UCB exploration strategies.

Problem-solving Assignments:

1. Design and implement a reinforcement learning agent solving CartPole using Q-Learning + experience replay.
2. Compare policy gradient methods vs value-based methods (DQN) on Atari games simulation.

LIST OF EXPERIMENTS

1. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
2. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
3. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
4. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file and compute the accuracy with a few test data sets.
5. Implement naïve Bayesian Classifier model to classify a set of documents and measure the accuracy, precision, and recall.
6. Write a program to construct a Bayesian network to diagnose CORONA infection using standard WHO Data Set.
7. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms.
8. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

TOTAL: 45+15= 60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain fundamental machine learning concepts, hypothesis spaces, generalization, and bias-variance trade-off.
- Apply supervised learning algorithms for regression and classification problems.
- Apply unsupervised learning and ensemble techniques for pattern discovery and prediction.
- Evaluate machine learning models using cross-validation, performance measures, and statistical significance tests.
- Explain reinforcement learning concepts, algorithms, and learning strategies.
- Implement machine learning algorithms and evaluate their performance using real-world datasets..

TEXT BOOKS

1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective ", CRC Press, Second Edition, 2014.

REFERENCES

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.

2. Tom Mitchell, "Machine Learning", McGraw Hill, Third Edition, 2007.

E-RESOURCES

1. https://nptel.ac.in/courses/106/105/106105152/ (Different Types of Learning)
2. https://nptel.ac.in/courses/106/106/106106202/ (Learning Problem)

Mapping of COs-POs & PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	3	2	-	2	2	1	3	3	3	3
CO2	2	2	3	2	2	3	2	2	3	2	2	2	3	2
CO3	3	3	3	3	3	2	-	2	2	2	3	3	3	3
CO4	3	3	3	3	3	2	-	2	2	2	3	3	3	3
CO5	3	3	3	3	3	2	-	2	2	2	3	3	3	3
CO6	3	3	3	3	3	3	3	3	3	3	3	3	3	3
AVG	2.7	2.7	2.7	2.7	2.7	2.3	0.8	2.1	2.3	2	2.8	2.8	3	2.8

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - Bo

23CSE402 **DATABASE MANAGEMENT SYSTEMS** L T P C

3 0 2 4

OBJECTIVES

The main objective of the course is,

- To impart the fundamentals of data models, relational algebra and SQL.
- To familiarize the database system using ER diagrams and normalization techniques.
- To develop the comprehensive knowledge of transaction processing, concurrency control techniques and recovery procedures.
- To enable the student to understand the internal storage structures using different file and indexing techniques for database design.
- To foster the knowledge on different database structures and information retrieval techniques.
- To provide practical exposure in relational database design, SQL programming and database connectivity for real world application development.

UNIT I: RELATIONAL DATABASES 9

Introduction: Database System Application-Purpose of Database System – Views of data -Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Embedded SQL– Dynamic SQL

Coding Exercises:

1. Create SQL scripts using DDL commands to create and modify relational tables.
2. Write SQL queries using DML commands to insert, update, delete, and retrieve data.
3. Implement basic relational algebra operations using SQL queries.

Problem-Solving Assignments:

1. Analyze a real-world application and design its relational schema with appropriate keys.
2. Convert given relational algebra expressions into equivalent SQL queries.

UNIT II : DATABASE DESIGN 9

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model –ER Design Issues - Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form- Join Dependencies and Fifth Normal Form

Coding Exercises:

1. Draw ER diagrams for given problem statements using database design tools.
2. Convert ER diagrams into relational schemas with constraints.
3. Normalize unnormalized tables up to 3NF and BCNF.

Problem-Solving Assignments:

1. Design a complete database schema for a real-world system (Library, Hospital, Banking).
2. Analyze functional dependencies and perform lossless decomposition.

UNIT III : TRANSACTIONS 9

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – SQL Facilities for Concurrency and Recovery.

Coding Exercises:

1. Write SQL programs demonstrating COMMIT, ROLLBACK, and SAVEPOINT.
2. Simulate concurrent transactions and observe isolation issues.
3. Implement simple locking behavior using transaction blocks.

Problem-Solving Assignments:

1. Analyze given schedules and determine their serializability.
2. Identify deadlock scenarios and propose suitable prevention techniques.

UNIT IV : PHYSICAL STORAGE AND INDEXING TECHNIQUES 9

Overview of Physical Storage Media - Magnetic Disks - RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Measure the Cost Estimation.

Coding Exercises:

1. Create indexed tables and analyze query performance.
2. Implement SQL queries using indexed attributes and compare execution cost.
3. Simulate hashing techniques using simple programs.

Problem-Solving Assignments:

1. Compare different indexing techniques and justify their use in specific scenarios.
2. Estimate query execution costs for given query plans.

UNIT V : ADVANCED TOPICS 9

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object- based Databases: Object Database Concepts, Object-Relational features - XML Databases: XML Hierarchical Model, purpose of XML -Information Retrieval: IR Concepts and Advantages.

Coding Exercises:

1. Write XML documents and query them using basic XML techniques.
2. Implement object-relational features using user-defined types.
3. Simulate distributed database queries using multiple schemas.

Problem-Solving Assignments:

1. Design a distributed database architecture for a multi-branch organization.
2. Compare relational, object-relational, and XML databases for specific applications.

LIST OF EXPERIMENTS

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements.
2. Implement Relational model to entitle ann strong and weak entities.

3. Database Querying – Simple queries, Nested queries, Sub queries and Joins.
4. Views, Sequences, Synonyms.
5. Database Programming: Implicit and Explicit Cursors.
6. Procedures and Functions.
7. Triggers.
8. Exception Handling.
9. Database Design using ER modelling, normalization and Implementation for any application.
10. Database Connectivity with Front End Tools.
11. Case Study using real life database applications.

TOTAL: 45+15=60 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to,

- Explain the fundamentals of data models, relational algebra and SQL.
- Apply ER diagrams and normalization techniques in database applications.
- Analyze transaction processing, concurrency control techniques and recovery procedures for database transactions.
- Analyze the internal storage structures and indexing techniques for improving the database design.
- Analyze the different database structures and information retrieval techniques for efficient data management.

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts, Sixth Edition, Tata McGraw Hill,2011.
2. Ramez Elmasri, Shamkant B.Navathe,—Fundamentals of Database Systems, Sixth Edition, Pearson Education,2011.

REFERENCES

1. C.J.Date,A.Kannan,S.Swamynathan,"An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, "Database Management Systems", 4th Edition, McGraw–Hill College Publications, 2015.

E-RESOURCES

1. https://nptel.ac.in/courses/106/105/106105175/ (Introduction to DBMS)
2. https://nptel.ac.in/courses/106/106/106106093/ (Conceptual Designs)

Mapping of COs-POs& PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	2	2	3	–	–	1	1	1	–	2	3	3
2	3	3	3	2	3	–	–	1	1	1	–	2	3	3
3	3	3	3	3	3	1	1	2	2	1	–	3	3	3
4	3	3	3	3	3	1	1	2	2	1	–	3	3	3
5	3	3	3	3	3	1	1	2	2	2	1	3	3	3
6	3	3	3	3	3	2	1	2	3	2	2	3	3	3
AVG	3.00	3.00	2.83	2.67	3.00	1.25	1.00	1.67	1.83	1.33	1.50	2.67	3.00	3.00

1-Low **2-Medium 3-High '-' – No Correlation**

Chairman - BoS

23EEC401 **ONLINE COURSE COMPLETION** L T P C
3 0 0 3

Students may be permitted to study online courses (NPTEL, SWAYAM or any Proctored Assessment Certification Courses) with 3 credits during the 4th semester curriculum for all B.E./B.Tech. Programmes. Such courses offered to students shall be recommended by the Department Academic Committee (DAC). The DAC shall ensure that the courses offered are not core courses in their respective curriculum.

The number of credits and transfer of credits are based on the procedure explained in following Table. The mapping of marks with grades is applicable only if the student passes the course as per the guidelines of NPTEL.

S.No.	No. of Weeks	Credits
1	4	1
2	8	2
3	12	3
4	16	4

Chairman - BoS

MINOR DEGREE / HONOURS

CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(MINOR/HONOURS DEGREE – FULL STACK DEVELOPMENT)

B.Tech. – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23ADFT01	Client-Server Scripting Languages	PC	3	0	0	3	40	60	100
23ADFT02	Web Essentials	PC	3	0	0	3	40	60	100
23ADFT03	DevOps Engineering	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADFE01	Cloud Computing Services	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23ADFP01	Project Work	EEC	0	0	12	6	40	60	100
Total Credits			**19**						

HS : Humanities and Social Sciences
BS : Basic Sciences
ES : Engineering Sciences
PC : Professional Core
PE : Professional Elective
OE : Open Elective
GE : General Elective
EEC : Employability Enhancement Courses
MC : Mandatory Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

SEMESTER - III

23ADFT01 CLIENT-SERVER SCRIPTING LANGUAGES L T P C

3 0 0 3

OBJECTIVES

- To discuss fundamental principles of web development.
- To analyze handling of HTTP requests and responses on the server-side.
- To explore AJAX, RESTful APIs, and JSON concepts.
- To implement user registration and login functionality.
- To apply security best practices to prevent common web vulnerabilities.

UNIT I INTRODUCTION TO WEB DEVELOPMENT AND CLIENT-SIDE SCRIPTING 9

Introduction to web development principles, Overview of client-server architecture, Setting up the development environment, Basics of HTML, CSS, and JavaScript, DOM manipulation and event handling.

Coding Exercises:

1. Build a simple webpage using HTML, CSS, and JavaScript that manipulates DOM elements on user interaction.
2. Implement event handling for mouse clicks and keyboard inputs to change webpage content dynamically.
3. Create a responsive webpage layout that adapts between desktop and mobile viewports using CSS media queries.

Problem-solving Assignments:

1. Analyze the client-server model workflow for a web application and map the data flow between browser and server.
2. Design a browser-based form with client-side validation and user feedback for data entry errors.

UNIT II SERVER-SIDE SCRIPTING FUNDAMENTALS 9

Introduction to server-side scripting languages (e.g., PHP, Node.js, Python, or Ruby), Handling HTTP requests and responses, Working with server-side databases, Implementing basic server-side logic.

Coding Exercises:

1. Create a basic RESTful API using Node.js or Python Flask that handles GET and POST requests.
2. Write server-side scripts to connect to a MySQL/PostgreSQL database and perform CRUD operations.
3. Implement error handling and response status codes for malformed HTTP requests

in your server app.

Problem-solving Assignments:

1. Design and implement a session management system to handle user logins and authentication on the server.
2. Analyze performance differences between synchronous and asynchronous server-side request handling.

UNIT III COMMUNICATION BETWEEN CLIENT AND SERVER 9

AJAX (Asynchronous JavaScript and XML) for client-server communication, RESTful API concepts and implementation, Data exchange between client and server, JSON (JavaScript Object Notation) and its usage.

Coding Exercises:

1. Write AJAX calls in JavaScript to asynchronously fetch data from server APIs and update webpage content.
2. Develop RESTful API endpoints supporting JSON data exchange between client and server.
3. Implement client-side JavaScript to consume and display JSON data from server responses dynamically.

Problem-solving Assignments:

1. Design an efficient client-server synchronization protocol using REST APIs and real-time data updates.
2. Analyze the security risks of AJAX and RESTful services and propose mitigation strategies.

UNIT IV DATA STORAGE AND USER MANAGEMENT 9

Introduction to databases (e.g., MySQL, MongoDB, or PostgreSQL), CRUD operations using server-side scripting languages, Implementing user registration and login functionality, User authentication and authorization.

Coding Exercises:

1. Write server-side scripts to implement user registration, login, and logout functionality with password hashing.
2. Create CRUD operations for user profiles stored in a NoSQL database like MongoDB.
3. Implement role-based access control for different user types with session validation.

Problem-solving Assignments:

1. Design a secure user authentication and authorization system protecting against

common vulnerabilities.

2. Develop a database schema and access layer for a scalable user management system.

UNIT V ADVANCED TOPICS AND PROJECT DEVELOPMENT 9

Front-end frameworks (e.g., React, Angular, or Vue.js) and integrating them with server-side scripts, Server-side templating and generating dynamic content, Security best practices for web applications, Deployment and hosting options for web applications, Final project development: Students work on a comprehensive web application that demonstrates the skills learned throughout the course.

Coding Exercises:

1. Build a front-end app using React or Angular integrating with your server API for a complete user interface.
2. Implement server-side rendering and template engines to dynamically generate web pages.
3. Set up deployment scripts using cloud hosting platforms like AWS or Heroku for your web app.

Problem-solving Assignments:

1. Analyze the trade-offs between client-side rendering and server-side rendering for performance and SEO.
2. Develop a comprehensive testing and security plan for a full-stack web application.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of this course, the students will be able to:

- Explain the web development principles and the client-server architecture.
- Create server-side databases and implement basic server-side logic to process data and generate dynamic content.
- Explain about AJAX (Asynchronous JavaScript and XML), concepts of RESTful APIs and JSON (JavaScript Object Notation).
- Develop user registration and login functionality with user authentication and authorization features.
- Describe about deployment and hosting options for web applications.

TEXT BOOKS

1. David Flanagan, O'Reilly Media, "JavaScript: The Definitive Guide", Inc. Publications, Seventh Edition, 2020.
2. Mario Casciaro and Luciano Mammino, "Node.js Design Patterns", Packet Publishing Limited Publications, 2020.

REFERENCES

1. Miguel Grinberg , " Flask Web Development: Developing Web Applications with Python", Shroff/O'Reilly Publications, Second Edition, 2018.
2. Eve Porcello, Alex Banks, "Learning React: Modern Patterns for Developing React Apps", O'Reilly Publications, Second Edition, 2020.

E-RESOURCES

1. https://developer.mozilla.org/en-US/docs/Web/JavaScript (MDN Web Docs - JavaScript)
2. https://nodejs.org/en/docs/ (Node.js Official Documentation)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO11	PSO1	PSO2
1	2	1	3	-	1	-	3	-	-	-	-	-	-	-
2	1	-	2	-	1	-	-	-	-	-	-	-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	-	-	-
4	1	1	2	1	-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-
6	2	3	-	2	3	-	-	-	-	-	-	-	-	-
AVG	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

SEMESTER IV

23ADFT02	WEB ESSENTIALS	L T P C
		3 0 0 3

OBJECTIVES

- To examine web protocols, URLs, domain names, web browsers, and web servers.
- To explore HTML and CSS for web page designing.
- To analyze JavaScript for client-side scripting and validation.
- To investigate server-side scripting using PHP and database handling.
- To study Java Servlets and their role in web applications.

UNIT I WEBSITE BASICS 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.

Coding Exercises:

1. Create a simple static website using HTML to display personal or business information.
2. Develop a website with client-side scripting using JavaScript to handle form inputs and validations.
3. Simulate client-server interaction by creating a basic web page that fetches data from a mock server using AJAX.

Problem-solving Assignments:

1. Analyze the flow of a website request-response cycle and create a diagram mapping client-server communication.
2. Compare different web protocols (HTTP, HTTPS) and discuss their impact on web browsing security.

UNIT II WEB DESIGNING 9

HTML – Form Elements - Input types and Media elements - CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface.

Coding Exercises:

1. Design forms using various HTML input types and style them using CSS3 selectors and box model properties.
2. Implement CSS3 animations and transitions on text and images for dynamic webpage interaction.

3. Create a multiple column layout webpage incorporating user interface elements and responsive design.

Problem-solving Assignments:

1. Evaluate an existing website's design for usability and accessibility, proposing visual improvements.
2. Design a brand style guide including colors, fonts, and UI patterns to maintain consistency across web pages.

UNIT III CLIENT-SIDE PROCESSING AND SCRIPTING 10

JavaScript Introduction – Variables and Data Types-Statements – Operators - Literals-Functions- Objects-Arrays-Built-in Objects- Regular Expression, Exceptions, Event handling, Validation - JavaScript Debuggers.

Coding Exercises:

1. Write JavaScript programs demonstrating variables, operators, functions, and array manipulations.
2. Implement event handling to respond to button clicks, mouse events, and form submissions with validation.
3. Use JavaScript debugger tools to identify and fix errors in sample scripts.

Problem-solving Assignments:

1. Develop a JavaScript application that validates user input in real-time and gives corrective feedback.
2. Analyze the advantages of client-side validation versus server-side validation in web forms.

UNIT IV SERVER SIDE PROCESSING AND SCRIPTING – PHP 8

PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - File Uploading – Email Basics - Email with attachments - PHP and HTML - Simple PHP scripts - Databases with PHP.

Coding Exercises:

1. Build PHP scripts to handle form data processing and store information in text files or databases.
2. Write PHP programs for file uploading and handling email sending with attachments.
3. Develop a simple PHP calculator and practice string functions and array handling.

Problem-solving Assignments:

1. Design a secure data handling mechanism in PHP to prevent SQL injection and other vulnerabilities.

2. Create a database-driven PHP application that manages user registrations and data updates.

UNIT V SERVLETS AND DATABASE CONNECTIVITY 9

Servlets: Java Servlet Architecture – Servlet Life cycle- Form GET and POST actions - Sessions – Cookies – Database connectivity – JDBC Creation of simple interactive applications - Simple database applications.

Coding Exercises:

1. Develop Java Servlets to handle GET and POST requests with form data processing.
2. Write servlet code to manage sessions and cookies for user tracking.
3. Connect servlets to a database using JDBC to perform CRUD operations.

Problem-solving Assignments:

1. Design a servlet-based web application architecture supporting multiple user sessions.
2. Analyze database connection pooling and transaction management strategies in servlet applications.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, the students will be able to:

- Explain fundamental concepts of the Internet, web protocols, URLs, and domain names.
- Design and develop responsive web pages using HTML and CSS.
- Build dynamic and interactive functionalities using JavaScript.
- Develop server-side applications using PHP and integrate them with databases.
- Explain Java Servlets to manage web applications and handle HTTP requests.

TEXT BOOKS

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", O'Reilly publishers, Third Edition, 2014.
2. Paul Deitel, Harvey Deitel, Abbey Deitel, "Internet & World Wide Web - How to Program", Pearson Education, Fifth Edition, 2012.

REFERENCES

1. Fritz Schneider, Thomas Powell , "JavaScript – The Complete Reference", Mc- Graw Hill Publishers, Third Edition 2017.

2. Jeffrey C. Jackson, "Web Technologies--A Computer Science Perspective", Pearson Education, 2006.

E-RESOURCES

1. 1.https://nptel.ac.in/courses/106105084 (HTML Basic)
2. 2.https://nptel.ac.in/courses/106105086 (Java script)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	2	3	1	-	-	2	3	1	2	2	3	3
2	2	2	2	3	3	-	-	1	2	2	3	3	1	1
3	3	3	3	3	3	-	-	2	1	1	2	2	2	1
4	3	3	1	1	1	-	-	1	3	1	3	3	2	1
5	3	2	2	2	3	-	-	2	3	2	2	2	2	3
6	3	3	3	3	2	-	-	1	2	3	1	1	3	3
Avg	2.8	2.5	2.2	2.5	2.2	-	-	1.5	2.3	1.7	2.2	2.2	2.2	2

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

SEMESTER V

23ADFT03	DEVOPS ENGINEERING	L T P C
		3 0 0 3

OBJECTIVES

- To examine DevOps terminology, definitions, and core concepts.
- To analyze version control tools, including Git and Mercurial.
- To explore Continuous Integration, Continuous Testing, and Continuous Deployment concepts.
- To investigate configuration management using Ansible.
- To assess benefits and adoption of cloud-based DevOps tools for real-world problem solving.

UNIT I INTRODUCTION TO DEVOPS 9

Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.

Coding Exercises:

1. Set up Git and GitHub repositories for a sample software project including version control commands (clone, commit, push).
2. Deploy a simple cloud instance in AWS, GCP, or Azure and run a basic web server.
3. Write a shell script to automate the deployment of code from GitHub to a cloud-hosted instance.

Problem-solving Assignments:

1. Analyze and compare advantages and challenges of AWS, Azure, and GCP for DevOps deployments.
2. Design a version control workflow using Git branching models for collaborative development.

UNIT II COMPILE AND BUILD USING MAVEN & GRADLE 9

Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases (compile build, test, package), Maven Profiles, Maven repositories (local, central, global), Maven plugins, Maven create and build Artifacts, Dependency management, Installation of Gradle, Understand build using Gradle.

Coding Exercises:

1. Create a Maven project with a POM file managing dependencies and build lifecycle phases.

2. Write a Gradle build script to compile and package a Java application with multiple modules.
3. Demonstrate managing Maven profiles for different build environments (dev, test, prod).

Problem-solving Assignments:

1. Compare and contrast Maven and Gradle in terms of build performance and dependency management.
2. Optimize a complex build process by configuring Maven plugins and Gradle tasks.

UNIT III CONTINUOUS INTEGRATION USING JENKINS 9

Install & Configure Jenkins, Jenkins Architecture Overview, Creating a Jenkins Job, Configuring a Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with Java, Git and Maven, Creating a Jenkins Build and Jenkins workspace

Coding Exercises:

1. Install and configure Jenkins to create a CI pipeline that builds and tests a Java project.
2. Add essential Jenkins plugins (Git, Maven, HTML Publisher) and configure automatic email notifications.
3. Write Jenkins Pipeline scripts for multi-stage build and test automation with workspace management.

Problem-solving Assignments:

1. Design a Jenkins-based CI/CD pipeline integrating Git, Maven, and automated testing.
2. Troubleshoot and resolve common Jenkins job failures and plugin compatibility issues.

UNIT IV CONFIGURATION MANAGEMENT USING ANSIBLE 9

Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible.

Coding Exercises:

1. Write Ansible playbooks to install and configure a web server on multiple virtual machines.
2. Use Ansible inventory files and roles to manage configuration of heterogeneous

environments.

3. Execute ad hoc Ansible commands for quick system management tasks and generate reports.

Problem-solving Assignments:

1. Develop a configuration management strategy using Ansible for dynamic cloud infrastructure.
2. Analyze challenges and best practices in managing multiple Ansible roles and playbooks.

UNIT V BUILDING DEVOPS PIPELINES USING AZURE 9

Create Github Account, Create Repository, Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file.

Coding Exercises:

1. Create a GitHub repository and integrate it with Azure Pipelines to trigger builds on code commits.
2. Write and modify an azure-pipelines.yaml file to automate build, test, and deployment stages.
3. Deploy a sample application to Azure App Service using the CI/CD pipeline.

Problem-solving Assignments:

1. Design a complete DevOps pipeline in Azure, optimizing for build times and deployment reliability.
2. Evaluate security and compliance concerns in pipeline design, and propose mitigation measures.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of the course, Students will be able to:

- Implement different actions performed through Version control tools like Git.
- Apply Continuous Integration and Continuous Testing and Continuous Deployment
- Develop the Automated Continuous Deployment
- Explain the configuration management using Ansible.
- Implement DevOps workflows using Azure DevOps cloud-based tools.

TEXT BOOKS

1. Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition,

2016.

2. Jason Cannon, "Linux for Beginners: An Introduction to the Linux Operating System and Command Line", Kindle Edition, 2014

REFERENCES

1. Hands-On Azure Devops: Cicd Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for DevOps and Microsoft Azure (English Edition) Paperback – 1 January 2020 by Mitesh Soni.

2. Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans", First Edition, 2015.

E-RESOURCES

1. https://www.jenkins.io/user-handbook.pdf
2. https://maven.apache.org/guides/getting-started/

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO11	PSO1	PSO2
1	3	1	1	1	3	-	-	-	1	3	1	1	3	3
2	3	1	2	1	2	-	-	-	1	2	2	2	1	2
3	2	2	1	2	3	-	-	-	2	1	1	1	3	2
4	2	3	3	1	1	-	-	-	2	2	2	2	2	1
5	1	2	1	3	1	-	-	-	3	2	1	1	3	3
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.2	1.8	1.6	1.6	2	-	-	-	1.8	2	1.4	1.4	2.4	2.2

1-Low **2-Medium 3-High '-' – No Correlation**

Chairman - BoS

SEMESTER VI

23ADFE01	CLOUD COMPUTING SERVICES	L T P C
		3 0 2 4

OBJECTIVES

- To introduce principles of cloud architecture, models, and infrastructure.
- To explore concepts of virtualization and virtual machines.
- To analyze virtualization infrastructure components.
- To experiment with various cloud deployment environments.
- To investigate security issues in cloud environments.
- To monitor and manage cloud performance for optimal service delivery and resource utilization.

UNIT I CLOUD ARCHITECTURE MODELS AND INFRASTRUCTURE 9

Cloud Architecture: System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture – Cloud deployment models – Cloud service models; Cloud Infrastructure: Architectural Design of Compute and Storage Clouds – Design Challenges

Coding Exercises:

1. Write a program simulating different Cloud deployment models like Public, Private, Hybrid clouds and demonstrate service accessibility.
2. Develop a project to model the NIST Cloud Computing Reference Architecture, mapping its major actors and service layers.
3. Create an architecture diagram tool that categorizes cloud services into Cloud service models such as SaaS, PaaS, and IaaS.

Problem-solving Assignments:

1. Analyze design challenges faced in Architectural Design of Compute and Storage Clouds and suggest scalable solutions.
2. Compare Autonomous Data Warehouse cloud infrastructure with traditional architectures in terms of operational efficiency.

UNIT II VIRTUALIZATION BASICS 9

Virtual Machine Basics – Taxonomy of Virtual Machines – Hypervisor – Key Concepts – Virtualization structure – Implementation levels of virtualization – Virtualization Types: Full Virtualization – Para Virtualization – Hardware Virtualization – Virtualization of CPU, Memory and I/O devices.

Coding Exercises:

1. Build simulators demonstrating Full Virtualization and Para Virtualization of virtual machines.
2. Write scripts to illustrate virtualization at different levels: CPU, Memory, and I/O device.
3. Implement a basic Hypervisor that manages resource allocation among virtual machines.

Problem-solving Assignments:

1. Devise a taxonomy categorizing common virtualization types and discuss their impact on cloud performance.
2. Examine virtualization security concerns dependent on implementation levels and propose safeguards.

UNIT III VIRTUALIZATION INFRASTRUCTURE AND DOCKER 9

Desktop Virtualization – Network Virtualization – Storage Virtualization – System-level of Operating Virtualization – Application Virtualization – Virtual clusters and Resource Management – Containers vs. Virtual Machines – Introduction to Docker – Docker Components – Docker Container – Docker Images and Repositories.

Coding Exercises:

1. Create Docker containers and images with scripted deployment and resource configuration.
2. Develop virtualization demonstrations encompassing desktop, network, and storage virtualization.
3. Write comparative scripts highlighting performance differences between Docker containers and full virtual machines.

Problem-solving Assignments:

1. Design a resource management policy for virtual clusters orchestrated through container technologies.
2. Analyze security vulnerabilities unique to container-based virtualization and formulate prevention approaches.

UNIT IV CLOUD DEPLOYMENT ENVIRONMENT 9

Google App Engine – Amazon AWS – Microsoft Azure; Cloud Software Environments – Eucalyptus – OpenStack.

Coding Exercises:

1. Automate deployment pipelines on Google App Engine, Amazon AWS, and Microsoft Azure to host simple applications.
2. Develop dashboards for managing cloud resources using Eucalyptus or OpenStack APIs.

3. Write scripts to provision virtual machines and storage across multiple cloud environments.

Problem-solving Assignments:

1. Create migration strategies from on-premises to cloud platforms considering differing architectures.
2. Evaluate multi-cloud deployment models optimizing performance and cost-effectiveness.

UNIT V CLOUD SECURITY 9

Virtualization System-Specific Attacks: Guest hopping – VM migration attack – hyperjacking. Data Security and Storage; Identity and Access Management (IAM) - IAM Challenges - IAM Architecture and Practice.

Coding Exercises:

1. Simulate attacks like Guest hopping, VM migration attack, and hyperjacking on virtual environments.
2. Implement basic Identity and Access Management (IAM) solutions with role-based access control.
3. Write encryption and secured storage mechanisms for cloud data protection.

Problem-solving Assignments:

1. Design an end-to-end cloud security architecture addressing vulnerabilities in virtualization systems.
2. Examine IAM Challenges and propose frameworks for resilient cloud identity management.

LIST OF EXPERIMENTS

1. Install Virtualbox/VMware/ Equivalent open source cloud Workstation with different flavours of Linux or Windows OS on top of windows 8 and above.
2. Install a C compiler in the virtual machine created using a virtual box and execute Simple Programs
3. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
4. Use the GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Install Hadoop single node cluster and run simple applications like wordcount.
8. Creating and Executing Your First Container Using Docker.

9. Run a Container from Docker Hub

TOTAL: 45 + 15 = 60 PERIODS

OUTCOMES

Upon completion of this course, the students will be able to:

- Explain different cloud architecture models for distributed and cloud computing
- Apply the concept of virtualization and its types.
- Experiment with virtualization of hardware resources and Docker.
- Develop and deploy services on the cloud and set up a cloud environment.
- Explain security challenges in the cloud environment.
- Classify how cloud computing is applied in various industries, from startups to enterprises, to streamline operations and support business growth

TEXT BOOKS

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. James Turnbull, "The Docker Book", O'Reilly Publishers, 2014.

REFERENCES

1. James E. Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, "Cloud Security and Privacy: an enterprise perspective on risks and compliance", O'Reilly Media, Inc., 2009.

E-RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_cs14/preview (Basics of Computer Architecture and Organization, Networking)
2. https://nptel.ac.in/courses/106105167 (Cloud Computing)

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	1	1	-	-	-	2	3	1	1	2	1
2	3	1	2	2	1	-	-	-	1	2	1	1	2	2
3	2	3	2	3	1	-	-	-	3	1	1	1	1	1
4	1	2	3	3	3	-	-	-	3	3	1	1	1	3
5	2	3	3	1	3	-	-	-	2	2	1	1	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.2	2.2	2.2	1.8	1.8	2	-	-	2.2	2.2	1	1	1.6	1.8

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

SEMESTER VII

23ADFP01	PROJECT WORK	L T P C
		0 0 12 6

OBJECTIVES

- To develop students' learning and skills in a specific area of interest.
- To provide opportunities to apply theoretical knowledge from minor courses to practical, real-world scenarios or problems.
- To conduct research and investigations, fostering critical thinking and problem-solving skills.
- To promote collaboration and teamwork, enabling effective work in a team environment.
- To prepare project reports and participate in reviews and viva-voce examinations.

GUIDELINES

The student can select any topic which is relevant to his/her specialization of the programme. The student should continue the work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work, results and discussion, conclusion and references should be prepared as per the format prescribed by the University and submitted to the Head of the department. The students will be evaluated based on the report and viva-voce examination by a panel of examiners as per the Regulations.

TOTAL: 180 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Demonstrate a sound technical knowledge of their selected project topic.
- Develop problem-solving skills as they analyze issues, design solutions, and implement them in their projects.
- Improve their communication and presentation abilities.
- Build successful collaboration and teamwork will be evident in the project's execution and outcomes
- Explain new knowledge or insights to the relevant field, making it a valuable addition to the academic community.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	3	-	-	-	-	-	-	-	-	3	3
2	-	-	-	-	3	3	-	-	-	-	-	-	3	-
3	-	-	-	-	-	-	3	-	3	-	-	-	-	-
4	-	-	-	-	-	-	-	3	3	3	3	3	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	3	3
AVG	3	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low 2-Medium 3-High '-' – No Correlation.

Chairman - BoS

CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(MINOR DEGREE / HONOURS - FULL STACK DEVELOPMENT)

CREDIT SUMMARY

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Category	Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
PC	-	-	3	3	3	4	-	-	13
EEC	-	-	-	-	-	-	6	-	6
Total	-	-	3	3	3	4	6	-	19

CURRICULUM AND SYLLABI
FOR B.E. / B.Tech. DEGREE PROGRAMMES
(MINOR / HONOURS DEGREE - BLOCKCHAIN)
B.Tech. – ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Course Code	Name of the Subject	Category	Periods / Week			Credit	Maximum Marks		
			L	T	P	C	CIA	ESE	TOT
THEORY									
23ADBT01	Fundamentals of Blockchain	PC	3	0	0	3	40	60	100
23ADBT02	Blockchain Platforms and Use cases	PC	3	0	0	3	40	60	100
23ADBT03	Blockchain Security and Performance	PC	3	0	0	3	40	60	100
EMBEDDED COURSE									
23ADBE01	Smart Contracts and Solidity	PC	3	0	2	4	50	50	100
EMPLOYABILITY ENHANCEMENT COURSE									
23ADBP01	Project Work	EEC	0	0	12	6	40	60	100
Total Credits			**19**						

PC : Professional Core
EEC : Employability Enhancement Courses
L : Lecture
T : Tutorial
P : Practical
C : Credit Point
CIA : Continuous Internal Assessment
ESE : End Semester Examination
TOT : Total

SEMESTER - III

23ADBT01	FUNDAMENTALS OF BLOCKCHAIN	L T P C
		3 0 0 3

OBJECTIVES

- To discuss fundamental concepts of blockchain technology.
- To analyze the Bitcoin blockchain model.
- To explore the Ethereum blockchain, focusing on smart contracts, structure, operations, consensus, and incentive models.
- To investigate various types of blockchain.
- To understand different consensus algorithms used in blockchain networks.

UNIT I INTRODUCTION 9

The Double-Spend Problem, Byzantine Generals' Computing Problems, PublicKey Cryptography, Hashing, Distributed Systems, Distributed Consensus.

Coding Exercises:

1. Implement a simple hash function and demonstrate its role in blockchain data immutability.
2. Simulate the Byzantine Generals' Problem using a consensus algorithm in a distributed system.
3. Develop basic public-key cryptography operations (key generation, encryption, and decryption) in Python.

Problem-solving Assignments:

1. Analyze the mechanics and implications of the Double-Spend problem in digital currencies.
2. Design a distributed consensus protocol to tolerate certain node failures and malicious actors.

UNIT II TECHNOLOGY STACK AND BITCOIN BLOCKCHAIN 9

Technology Stack: Blockchain, Protocol, Currency. Bitcoin Blockchain: Structure, Operations, Features, Consensus Model, Incentive Model.

Coding Exercises:

1. Build a simplified model of the Bitcoin blockchain including block structure and proof-of-work.
2. Simulate Bitcoin's incentive model with mining rewards and transaction fees in a small network of nodes.
3. Write code to validate Bitcoin transactions and build a simplified UTXO (Unspent

Transaction Output) system.

Problem-solving Assignments:

1. Compare Bitcoin's consensus model with alternative blockchain consensus mechanisms.
2. Analyze security assumptions and potential vulnerabilities in Bitcoin's blockchain structure.

UNIT III ETHEREUM BLOCKCHAIN 9

Ethereum Blockchain: Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model.

Coding Exercises:

1. Create and deploy a "Hello World" smart contract on Ethereum testnet using Solidity and Remix IDE.
2. Write smart contracts in Solidity to implement simple token transfers and state changes.
3. Build an Ethereum App interacting with smart contracts through web3.js or ethers.js.

Problem-solving Assignments:

1. Design a decentralized voting application using Ethereum smart contracts emphasizing security and transparency.
2. Analyze Ethereum's incentive and consensus models, discussing scalability challenges.

UNIT IV TIERS OF BLOCKCHAIN TECHNOLOGY 9

Tiers of Blockchain Technology: Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types of Blockchain: Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains.

Coding Exercises:

1. Develop example applications illustrating Blockchain 1.0, 2.0, and 3.0 capabilities.
2. Simulate private and public blockchain environments highlighting access controls.
3. Implement sidechain functionality to offload transactions from a main blockchain.

Problem-solving Assignments:

1. Evaluate the trade-offs between different types of blockchains (public, private, semi-private).
2. Design a blockchain architecture for supply chain management optimizing performance and security.

UNIT V TYPES OF CONSENSUS ALGORITHMS 9

Types of Consensus Algorithms: Proof of Stake, Proof of Work, Delegated Proof of Stake,

Proof Elapsed Time, Deposite-Based Consensus, Proof of Importance, Federated Consensus or Federated Byzantine Consensus, Practical Byzantine Fault Tolerance. Blockchain Use Case: Supply Chain Management.

Coding Exercises:

1. Implement proof-of-work (PoW) and proof-of-stake (PoS) consensus algorithms in simplified models.
2. Write simulations of federated consensus and practical Byzantine fault tolerance (PBFT) protocols.
3. Create a basic supply chain use case demonstrating consensus-based validation.

Problem-solving Assignments:

1. Compare energy consumption and security of various consensus algorithms.
2. Analyze how delegated proof of stake (DPoS) and proof elapsed time affect blockchain decentralization.

TOTAL : 45 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Demonstrate a clear understanding of the fundamental concepts and challenges addressed by blockchain technology.
- Explain the Technology Stack of blockchain systems and the roles of Blockchain, Protocol, and Currency layers in a blockchain ecosystem.
- Analyze the Ethereum Blockchain, with a focus on Smart Contracts, Ethereum Structure, Operations, Consensus Model, and Incentive Model.
- Differentiate between various tiers of blockchain technology and understand the unique characteristics of different types of blockchains.
- Compare and contrast various Consensus Algorithms used in blockchain networks.

TEXT BOOKS

1. Kirankalyan Kulkarni, "Essentials of Bitcoin and Block chain", Packt Publishing, 2018.
2. Anshul Kaushik, "Block Chain & Crypto Currencies", Khanna Publishing House, 2018.

REFERENCES

1. Tiana Laurence, "Block chain for Dummies",John Wiley & Sons, Second Edition 2019.
2. Imran Bashir, "Mastering Block chain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Block chain frameworks" , Packet Publishing 2017.

E-RESOURCES

1. https://www.coursera.org/specializations/blockchain
2. https://nptel.ac.in/courses/106105184/
3. https://swayam.gov.in/nd1_noc20_cs01/preview

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	2	1	1	1	-	-	-	2	3	1	1	2	1
2	3	1	2	2	1	-	-	-	1	2	1	1	2	2
3	2	3	2	3	1	-	-	-	3	1	1	1	1	1
4	1	2	3	3	3	-	-	-	3	3	1	1	1	3
5	2	3	3	1	3	-	-	-	2	2	1	1	2	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.2	2.2	2.2	1.8	1.8	2	-	-	2.2	2.2	1	1	1.6	1.8

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

SEMESTER IV

23ADBT02	BLOCKCHAIN PLATFORMS AND USE CASES	L T P C
		3 0 0 3

OBJECTIVES

- To explore different types of blockchain platforms.
- To analyze decentralized applications (DApps) developed using blockchain technology.
- To compare blockchain platforms based on consensus mechanisms, performance, scalability, security, and use case suitability.
- To investigate real-world use cases for blockchain technology.
- To examine various blockchain application scenarios.

UNIT I PERMISSIONED BLOCKCHAINS 9

Hyperledger Fabric Services, Model and Functions, Hyperledger Composer, Microsoft Azure Blockchain Platform and Services, Other Platforms: IOTA, TRON, Ziliqa, Cosmos, Ripple.

Coding Exercises:

1. Deploy a Hyperledger Fabric network using Docker and create channels with multiple organizations.
2. Write Hyperledger Composer models for assets, participants, and transactions in a commodity trading network.
3. Set up Microsoft Azure Blockchain Service and deploy a sample smart contract using Azure CLI.

Problem-solving Assignments:

1. Compare Hyperledger Fabric architecture with IOTA, TRON, and Zilliqa for enterprise use cases.
2. Design a multi-organization permissioned blockchain network using Hyperledger Fabric services.

UNIT II DECENTRALIZED APPLICATION PLATFORMS 9

Augur-Decentralised Prediction Market Platform, Grid+-Energy Ecosystem Platform.

Coding Exercises:

1. Build a prediction market dApp similar to Augur using Ethereum smart contracts and React frontend.
2. Create a decentralized energy trading platform prototype simulating Grid+ energy ecosystem.

3. Develop oracle integration for external data feeds in prediction market applications.

Problem-solving Assignments:

1. Analyze scalability challenges in decentralized prediction markets and propose layer-2 solutions.
2. Design tokenomics and incentive models for energy ecosystem platforms.

UNIT III CHALLENGES AND SOLUTIONS RELATED TO BLOCKCHAIN 9

Consensus, Scalability, Privacy and Confidentiality, Escrow, and Multi signature.

Coding Exercises:

1. Implement multi-signature wallets using Ethereum smart contracts for escrow functionality.
2. Develop privacy-preserving smart contracts using zero-knowledge proofs or private transactions.
3. Create scalable consensus mechanisms comparing PoW, PoS, and hybrid approaches.

Problem-solving Assignments:

1. Design solutions addressing blockchain trilemma (scalability, security, decentralization).
2. Analyze privacy requirements for financial applications and implement confidentiality layers.

UNIT IV INTERPLANETARY FILE SYSTEM 9

Alternative Decentralized Solutions: Interplanetary File System (IPFS) Working and Uses, Hashgrapgh- Working, Benefits, And Use-Cases.

Coding Exercises:

1. Build a decentralized file storage application using IPFS for content addressing and retrieval.
2. Implement IPFS pubsub messaging for peer-to-peer communication in decentralized apps.
3. Create a Hashgraph prototype simulating gossip protocol and virtual voting consensus.

Problem-solving Assignments:

1. Compare IPFS with traditional cloud storage in terms of cost, availability, and censorship resistance.
2. Design hybrid storage solutions combining IPFS with blockchain for metadata

anchoring.

UNIT V BLOCKCHAIN USE CASES 9

Financial Services Related Use Cases, Revolutionization of Global Trade, Digital Identity, Auditing Services, Supply Chain Management, Healthcare Related Services, Blockchain and IOT, Blockchain and AI.

Coding Exercises:

1. Develop a supply chain tracking dApp using Ethereum smart contracts and IPFS for document storage.
2. Build a digital identity verification system with self-sovereign identity principles.
3. Create healthcare data sharing platform with patient consent management via smart contracts.

Problem-solving Assignments:

1. Design blockchain-IoT integration for real-time supply chain monitoring with edge computing.
2. Analyze AI-blockchain convergence for secure federated learning and model provenance tracking.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Classify various blockchain platforms and their underlying technologies
- Explain the concept of the Grid+-Energy Ecosystem Platform and its decentralized nature for energy-related applications.
- Identify and analyze the challenges related to consensus mechanisms in blockchain networks and propose potential solutions
- Explain a clear understanding of the Interplanetary File System (IPFS) and its decentralized approach to file storage and sharing
- Explain the use of block chain technology in various financial services applications, such as payment systems, remittances, and asset tokenization

TEXT BOOKS

1. Tiana Laurence, "Blockchain for Dummies", John Wiley & Sons Publisher, Second Edition 2019.

2. Anshul Kaushik, "Block Chain & Crypto Currencies", Khanna Publishing House, 2018.

REFERENCES

1. Narayan Prusty, "Building Blockchain Projects", Packt Publishing, 2017.
2. Imran Bashir, "Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks", Packt Publishing, 2017.

E-RESOURCES

1. https://nptel.ac.in/courses/106105184/
2. https://www.coursera.org/learn/blockchain-platforms

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO11	PSO1	PSO2
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2	2	3	1	3	2	-	-	-	1	2	2	2	1	2
3	1	3	3	2	2	-	-	-	2	3	1	1	1	3
4	1	2	3	3	1	-	-	-	3	2	1	1	3	3
5	1	2	3	2	1	-	-	-	2	1	1	1	3	2
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	1.6	2.2	2.2	2.6	1.4	-	-	-	2.2	2.2	1.4	1.4	2.2	2.6

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - Bo

SEMESTER V

23ADBT03	BLOCKCHAIN SECURITY AND PERFORMANCE	L T P C
		3 0 0 3

OBJECTIVES

- To examine blockchain security issues.
- To learn smart contract security tools.
- To analyze blockchain performance challenges.
- To explore performance improvement techniques.
- To evaluate blockchain applications.

UNIT I SECURITY ISSUES 9

Blockchain Related Issues, Higher-Level Language (Solidity) Related Issues, EVM Bytecode Related Issues, Real-Life Attacks on Blockchain Applications/ Smart Contracts, Trusted Execution Environments

Coding Exercises:

1. Write Solidity code demonstrating reentrancy vulnerability and implement the Checks-Effects-Interactions pattern to fix it.
2. Simulate integer overflow/underflow attacks using Solidity and mitigate with SafeMath library.
3. Create a vulnerable smart contract exhibiting access control issues and secure it with OpenZeppelin's Ownable/AccessControl contracts.

Problem-solving Assignments:

1. Analyze real-world attacks like The DAO hack or Parity wallet incidents and identify root causes.
2. Design secure smart contract patterns for handling external calls and untrusted inputs.

UNIT II SECURITY TOOLS FOR SMART CONTRACTS 9

Working, Advantages, And Disadvantages of Tools- Oyente, Securify, Maian, Manticore, Mythril, SmartCheck, Verx. Secure Key Management, Quantum Resilience Keys.

Coding Exercises:

1. Run Mythril analysis on vulnerable Solidity contracts and interpret security warnings.
2. Use Slither static analyzer to detect common vulnerabilities in sample smart contracts.
3. Deploy Manticore for symbolic execution testing on simple smart contracts and

analyze results.

Problem-solving Assignments:

1. Compare effectiveness of Oyente, Securify, and Mythril on benchmark vulnerable contracts.
2. Implement secure key management practices and evaluate quantum-resistant cryptography options.

UNIT III PERFORMANCE RELATED ISSUES 9

Transaction Speed, Transaction Fees, Network Size, Complexity, Interoperability Problems, Lack of Standardization. Lack of Supportive Regulations Related to Blockchain Applications

Coding Exercises:

1. Measure transaction speed and gas costs for different smart contract complexity levels.
2. Simulate network congestion scenarios and analyze impact on transaction finality times.
3. Benchmark interoperability challenges between different EVM-compatible chains.

Problem-solving Assignments:

1. Analyze transaction fee dynamics during network congestion and propose mitigation strategies.
2. Evaluate standardization challenges across different blockchain ecosystems.

UNIT IV PERFORMANCE IMPROVEMENTS 9

Off-Chain State Channels, Sidechains, Parallels Chains, Concurrent Smart Contract Transactions, Sharding Technique and Its Benefits, Atomic Swaps Between Smart Contracts.

Coding Exercises:

1. Implement a state channel prototype for off-chain payments between two parties.
2. Create a simple sidechain bridge contract for asset transfers between mainnet and sidechain.
3. Simulate sharding by partitioning smart contract state across multiple shards.

Problem-solving Assignments:

1. Design atomic swap mechanisms between different blockchain networks.
2. Compare parallel transaction processing techniques and their scalability benefits.

UNIT V BLOCKCHAIN APPLICATIONS 9

Decentralized Cryptocurrency, Distributed Cloud Storage, EVoting, Insurance Claims, Cross-Border Payments, Asset Management, Smart Appliances.

Coding Exercises:

1. Build a decentralized eVoting system using smart contracts with quadratic voting mechanisms.
2. Develop insurance claims processing dApp with automated payouts based on oracle data.
3. Create cross-border payment smart contract integrating Chainlink price feeds.

Problem-solving Assignments:

1. Design asset tokenization platform for real-world assets with compliance requirements.
2. Analyze smart appliance integration challenges with blockchain and propose IoT-blockchain architecture.

TOTAL: 45 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Identify and evaluate security vulnerabilities and risks in blockchain applications and smart contracts
- Explain a thorough understanding of various security tools used for auditing and analyzing smart contracts
- Recognize the challenges related to interoperability and the lack of supportive regulations for blockchain applications
- Identify and apply performance improvement techniques to enhance the scalability and efficiency of blockchain systems
- Understand the potential benefits and limitations of implementing blockchain solutions in different real-world scenarios

TEXT BOOKS

1. Andreas Antonopoulos and Gavin Wood, " Mastering Ethereum: Building Smart Contracts and Dapps ", Shroff Publisher/O'Reilly Publisher.
2. Rajendra Akerkar, Natarajan Meghanathan, and Dhinaharan Nagamalai ,"Blockchain and Healthcare: New Era of Digital Health Systems", Springer Publisher, 2019.

REFERENCES

1. Daniel Drescher ,"Blockchain Basics: A Non-Technical Introduction in 25 Steps", Apress Publication, 2017.

2. Arshdeep Bahga and Vijay Madisetti, "Blockchain for Business: A Hands-On Approach", VPT Publisher, 2020.

E-RESOURCES

1. https://www.edx.org/course/blockchain-and-fintech-basics-applications-and-limitations
2. https://nptel.ac.in/courses/106105235

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
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2	1	3	3	3	2	-	-	-	1	2	2	2	1	2	2
3	2	3	3	3	1	-	-	-	1	3	1	2	1	2	1
4	3	3	1	1	1	-	-	-	3	1	1	3	2	3	3
5	3	2	2	3	2	-	-	-	1	2	1	2	2	2	1
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.4	2.6	2.4	2.2	1.5	-	-	-	1.4	2.2	1.2	2.2	1.8	2	1.6

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

SEMESTER VI

23ADBE01	SMART CONTRACTS AND SOLIDITY	L T P C
		3 0 2 4

OBJECTIVES

- To introduce concepts of smart contracts in blockchain technology.
- To analyze the lifecycle of smart contracts from development through deployment and execution.
- To explore the Solidity programming language for smart contract development.
- To investigate the Truffle framework and Ganache for smart contract testing and deployment.
- To develop decentralized applications (DApps) integrating smart contracts with front-end interfaces.
- To demonstrate processes for connecting smart contracts to DApp front-end applications.

UNIT I SMART CONTRACTS 9

Definition and Need, Features of Smart Contracts, Life Cycle of a Smart Contract, Introduction to Ethereum Higher-Level Languages.

Coding Exercises:

1. Write a basic Solidity contract demonstrating smart contract lifecycle (deployment, function calls, state changes).
2. Implement a simple voting contract showing features like immutability and transparency.
3. Create Ethereum account management scripts using Web3.js to interact with contract ABIs.

Problem-solving Assignments:

1. Analyze use cases where smart contracts provide advantages over traditional contracts.
2. Design smart contract architecture for a decentralized escrow service.

UNIT II DEVELOPMENT ENVIRONMENT 9

Building A Simple Smart Contract with Solidity, SolcCompiler, Ethereum Contract ABI, Remix-IDE for Smart Contract Development.

Coding Exercises:

1. Deploy a "Hello World" smart contract using Remix IDE on JavaScript VM and

testnet.

2. Compile Solidity contracts using solc command line and generate ABI/bytecode files.
3. Write deployment scripts using Hardhat or Truffle for local Ethereum networks.

Problem-solving Assignments:

1. Compare Remix IDE vs local development environments for smart contract workflows.
2. Troubleshoot common compilation errors and deployment failures in Ethereum.

UNIT III INTRODUCTION TO SOLIDITY 9

Introduction to Solidity: Contracts, Constructors & Functions, Variables, Getters & Setters, Arrays, Memory vs Storage, Mappings in Solidity. Advanced Solidity: Structs, Error Handling & Restrictions, Libraries, Global Variables in Solidity, Abstract Contracts, Inheritance, And Interfaces, Events

Coding Exercises:

1. Create Solidity contracts using structs, mappings, arrays, and memory/storage distinctions.
2. Implement inheritance, interfaces, events, and error handling (require, assert, revert).
3. Build advanced contracts with libraries, modifiers, and getter/setter patterns.

Problem-solving Assignments:

1. Optimize gas usage by properly managing storage vs memory variables.
2. Design reusable contract patterns using abstract contracts and interfaces.

UNIT IV TRUFFLE FRAMEWORK & GANACHE 9

Environment Setup for Truffle & Ganache, Truffle Project Creation, Truffle Compile, Migrate and Create Commands.

Coding Exercises:

1. Set up Truffle suite with Ganache CLI/GUI and deploy contracts using truffle migrate.
2. Write Truffle test scripts using Mocha/Chai to test contract functionality.
3. Create Truffle project with multiple contracts, scripts, and migration files.

Problem-solving Assignments:

1. Configure Truffle for multi-network deployments (local, testnet, mainnet).
2. Implement CI/CD pipeline for smart contract testing using Truffle and Ganache.

UNIT V DECENTRALIZED APP CREATION 9

Smart Contract Creation, Front-End Creation, Connecting Smart Contract with Front-End Application, Deploying Dapp, Validation, And Testing of Dapp.

Coding Exercises:

1. Build complete DApp with React frontend connecting to Solidity contracts via

ethers.js.

2. Deploy DApp to IPFS and integrate MetaMask wallet for user authentication.
3. Implement DApp testing with end-to-end scenarios including contract interactions.

Problem-solving Assignments:

1. Design secure frontend-backend communication patterns for DApps.
2. Create deployment and validation strategy for production DApp launch.

LIST OF EXPERIMENTS

1. Create a simple Solidity smart contract that allows you to store and retrieve a "Hello, World!" message on the blockchain.
2. Develop a Solidity contract that accepts incoming transactions, stores sender information, and emits an event when a new transaction occurs.
3. Write a Solidity smart contract to create a basic ERC-20 token with functions for minting, transferring, and querying the token balance.
4. Design a crowdfunding smart contract where users can contribute funds, and the contract releases funds to the campaign creator when a predefined goal is reached.
5. Create a voting decentralized application (DApp) using Solidity, where users can cast their votes for a given proposal, and the contract calculates the winner.
6. Design a simple DAO using a Solidity smart contract, allowing members to vote on proposals for decision-making.
7. Implement a Solidity contract that locks funds for a specified duration and releases them only after a predetermined time.
8. Develop a Solidity contract that generates a random number using various methods like block hash and chainlink VRF.
9. Create a multi-signature wallet contract that requires multiple parties' approval for fund withdrawals.
10. Build a basic decentralized marketplace using Solidity, where users can list items for sale and other users can purchase them using cryptocurrency.

TOTAL : 45 + 15 = 60 PERIODS

OUTCOMES

Upon completion of this course, the students will be able to:

- Classify the life cycle of a smart contract, from its inception to execution and eventual termination.
- Create a simple smart contract using Solidity and the necessary tools like SolcCompiler and Remix-IDE

- Apply various data structures in Solidity, such as arrays and mappings, and differentiate between memory and storage usage
- Develop a Truffle project and learn how to use Truffle commands
- Design a complete decentralized application (DApp) by combining smart contract development with front-end creation
- Deploy the DApp on the Ethereum blockchain and perform thorough validation and testing to ensure its functionality and security

TEXT BOOKS

1. Tiana Laurence, "Blockchain for Dummies", John Wiley & Sons publisher, Second Edition 2019.
2. Anshul Kaushik, "Block Chain & Crypto Currencies", Khanna Publishing House , 2020.

REFERENCES

1. Narayan Prusty, "Building Blockchain Projects", Packt Publishing, 2017.
2. Andreas Antonopoulos and Gavin Wood, "Mastering Ethereum: Building Smart Contracts and Dapps", Shroff Publisher/O'Reilly Publisher, 2018.

E-RESOURCES

1. https://www.coursera.org/learn/smarter-contracts
2. https://www.udemy.com/course/solidity-smart-contracts-build-dapps-in-ethereum-blockchain/

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	1	3	-	1	-	3	-	-	-	-	2	-	-	-
2	1	-	2	-	1	-	-	-	-	-	-	-	-	-	-
3	2	2	3	1	1	1	-	-	-	-	-	1	-	-	-
4	1	1	2	1	-	-	-	-	-	-	-	-	-	-	-
5	2	1	2	1	3	-	1	-	-	-	-	-	-	-	-
6	2	3	-	2	3	-	-	-	-	-	-	-	-	-	-
AVG	1.6	1.6	2.4	1.25	1.8	1	2	-	-	-	-	1.5	-	-	-

1-Low 2-Medium 3-High '-' – No Correlation

Chairman - BoS

SEMESTER VII

23ADBP01	PROJECT WORK	L T P C
		0 0 12 6

OBJECTIVES

- To develop students' learning and skills in a specific area of interest.
- To provide opportunities for students to apply theoretical knowledge from their minor courses to practical, real-world scenarios or problems.
- To conduct research and investigations, fostering critical thinking and problem-solving skills.
- To promote collaboration and teamwork, enabling effective work in a team environment.
- To prepare project reports and participate in reviews and viva voce examinations.

GUIDELINES FOR REVIEW AND EVALUATION

The student can select any topic which is relevant to his/her specialization of the programme. The student should continue the work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work, results and discussion, conclusion and references should be prepared as per the format prescribed by the University and submitted to the Head of the department. The students will be evaluated based on the report and viva-voce examination by a panel of examiners as per the Regulations.

TOTAL: 180 PERIODS

OUTCOMES

Upon completion of this course, Students will be able to:

- Demonstrate a sound technical knowledge of their selected project topic.
- Develop problem-solving skills as they analyze issues, design solutions, and implement them in their projects.
- Improve their communication and presentation abilities.
- Build successful collaboration and teamwork will be evident in the project's execution and outcomes

- Explain new knowledge or insights to the relevant field, making it a valuable addition to the academic community.

Mapping of COs-POs & PSOs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3
2	-	-	-	-	3	3	-	-	-	-	-	-	3	-	-
3	-	-	-	-	-	-	3	-	3	-	-	-	-	-	3
4	-	-	-	-	-	-	-	3	3	3	3	-	-	-	3
5	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3
AVG	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

1-Low 2-Medium 3-High '-' – No Correlation.

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CURRICULUM AND SYLLABI

FOR B.E. / B.Tech. DEGREE PROGRAMMES

(MINOR DEGREE / HONOURS - BLOCKCHAIN)

CREDIT SUMMARY

B.Tech. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Category	Semester								Credit Total
	I	II	III	IV	V	VI	VII	VIII	
PC	-	-	3	3	3	4	-	-	13
EEC	-	-	-	-	-	-	6	-	6
Total	-	-	3	3	3	4	6	-	19