Dr. MAHALINGAM
COLLEGE OF ENGINEERING AND TECHNOLOGY
Udumalai Road, Pollachi, Coimbatore District - 642003
Established in 1998 ♦ Approved by AICTE ♦ Affiliated to Anna University
(A DIVISION OF NIA EDUCATIONAL INSTITUTIONS)
NAAC A++ GRADE
Cycle 3 (2023-2030)
The Highest Grade

Curriculum and Syllabi

B.Tech. Artificial Intelligence and Data Science

Semesters I to IV

Regulations 2023

Programme: B.Tech. Artificial Intelligence and Data Science
Curriculum and Syllabi: Semesters – I to IV
Recommended by Board of Studies on: 28.12.2023
Approved by Academic Council on: 23.03.24

Action	**Responsibility**	**Signature of Authorized Signatory**
Prepared by	BoS Artificial Intelligence and Data Science	
Compiled and Verified by	Office of the Controller of Examinations	
	Office of Academic Coordination Team	
Approved by	Principal	

Dr. Mahalingam College of Engineering and Technology, Pollachi 642003.

(An autonomous institution approved by AICTE and affiliated to Anna University)

Department of Artificial Intelligence and Data Science

Vision

To build quality engineers with diversified knowledge to compete globally with innovations in the domain of Artificial Intelligence and Data Science

Mission

- To impart technical content in latest technologies through industry collaborative curriculum
- To produce young engineers with expert knowledge to hoist industry's growth
- To foster ethical engineers for resolving community issues through automation solutions
- To motivate engineers to employ ethical conduct of research for societal benefits

Programme: B.Tech. Artificial Intelligence and Data Science

Programme Educational Objectives (PEOs) - Regulations 2023

B.Tech. Artificial Intelligence and Data Science graduates will:

PEO1. Domain Knowledge: Possess diversified knowledge and expertise in the domain of Artificial Intelligence and Data Science

PEO2. Problem solving skills and Ethics: Apply computing skills to identify the challenges and to develop creative ethical solutions

PEO3. Lifelong Learning and development: Involve in lifelong learning, research and development to fulfill social needs using latest technology

Programme Outcomes (POs) - Regulations 2023

On successful completion of B.Tech. Artificial Intelligence and Data Science, graduating students/graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, concepts of Artificial Intelligence and data science to solve complex engineering problems

PO2. Problem Analysis: Identify, review literature, formulate and analyze complex engineering problems using first principles of mathematics and engineering sciences

PO3. Design and Development of Solutions: Design and develop AI based solutions for complex engineering problems with societal and environmental awareness

PO4. Complex problem Investigation: Investigate complex problems by employing skills pertaining to knowledge acquisition, knowledge representation and knowledge engineering to arrive at valid conclusions

PO5. Modern Tool Usage: Evaluate and use Data analysis tools and AI based techniques for effective decision making in business and engineering domains

PO6. Societal contribution: Follow professional engineering practice by applying contextual knowledge to assess societal and legal issues

PO7. Environment and Sustainability: Understand and provide professional engineering solutions taking into consideration environmental and economic sustainability

PO8. Ethics: Follow ethical principles and norms in engineering practice

PO9. Individual and Team work: Function effectively as an individual, team member or leader in diversified environments

PO10. Communication: Communicate and present the actionable insights of data using reports through various modes for all professional activities

PO11. Project Management and Finance: Apply Engineering knowledge and management principles for effective project management in multi-disciplinary environments

PO12. Life-long Learning: Engage in independent life-long learning and skill development for professional and social well being

Programme Specific Outcomes (PSOs) - Regulations 2023

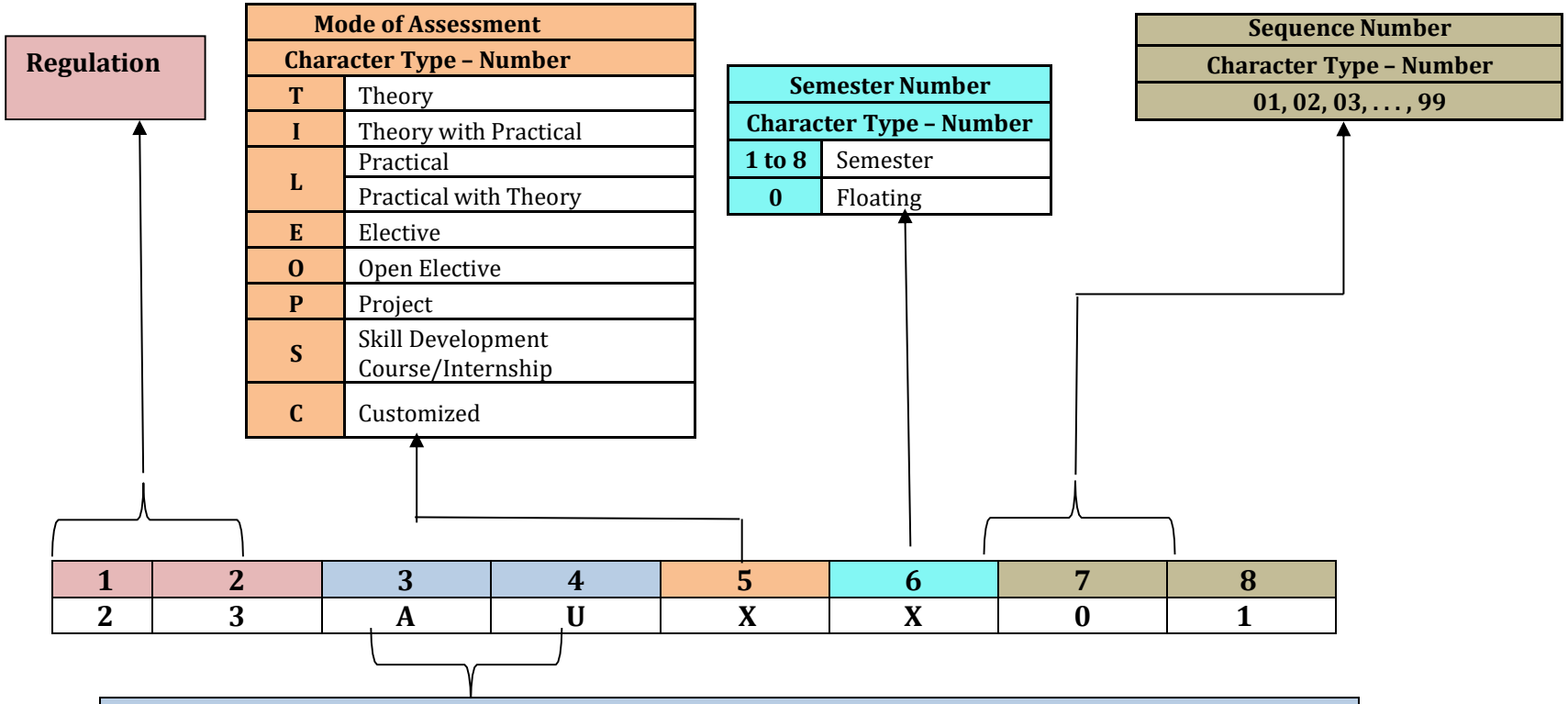
PSO1. Software Automation: Develop customized automation solutions for Engineering and business problems using intelligent techniques.

PSO2. Data Engineering: Predict significant information and visualize large scale data using latest technologies.

TL Coordinator **Programme Coordinator** **Head of the Department**

Head – TLC

Dr. Mahalingam College of Engineering and Technology, Pollachi
2023 Regulations - Course Code Generation Procedure for UG Courses



AD	Artificial Intelligence & Data Science	**ME**	Mechanical
AM	CSE (Artificial Intelligence & Machine Learning)	**SC**	CSE (Cyber Security)
AU	Automobile	**PH**	Physics
CE	Civil	**CH**	Chemistry
CS	Computer Science	**EN**	English
EA	Advanced Communication Technology	**MA**	Mathematics
EC	Electronics and Communication	**ES**	Employability Skills
EE	Electrical and Electronics	**VA**	Value Added Course
EV	VLSI Design & Technology	**SA**	Studio Activities
IT	Information Technology		

Programme: B.Tech. Artificial Intelligence and Data Science
2023 Regulations (For 2023 Batch Only)
Curriculum for Semester I & II

Type of Course	Course Code	Course Title	Duration	Credits	Marks
VAC	23VAL101	Induction Program	3 Weeks	-	100

Semester I

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI101	Communication Skills I	2	0	2	3	100	All
Minor	23MAI103	Linear Algebra and Infinite Series	3	0	2	4	100	AD,AM,CS,IT,SC
Minor	23PHT001	Physics for Information Sciences	3	0	0	3	100	AD,AM,CS,IT,SC
Major	23CST101	Problem Solving using C	3	0	0	3	100	AD,AM,CS,IT,SC
Multidisciplinary	23EEI101	Basics of Electrical and Electronics Engineering	3	0	2	4	100	AD,AM,CS,IT,SC
Minor	23PHL001	Physics for Information Sciences Laboratory	0	0	3	1.5	100	AD,AM,CS,IT,SC
SEC	23CSL101	Problem Solving using C Laboratory	0	0	3	1.5	100	AD,AM,CS,IT,SC
VAC	23VAL102	Wellness for Students	0	0	2	1	100	All
VAC	23VAT101	தமிழர்மரபு /Heritage of Tamils	1	0	0	1	100	All
AEC	23SAL101	Studio Activities	0	0	2	-	-	All
		Total	**15**	**0**	**16**	**22**	**900**	

Semester II

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI201	Communication Skills II	2	0	2	3	100	All
	23FLT201	Foreign Language- Japanese	3	0	0			
	23FLT202	Foreign Language- German	3	0	0			
Minor	23MAI203	Calculus and Transforms	3	0	2	4	100	AD, AM, CS, IT, SC
Major	23ITT201	Data Structures	3	0	0	3	100	AD, AM, CS, IT, SC
Multidisciplinary	23EEI201	Digital System Design	2	0	2	3	100	AD, AM, CS, IT, SC
Multidisciplinary	23MEL001	Engineering Drawing	1	0	3	2.5	100	AD,AM,CS,EA, EC,EE,EV,IT,SC
SEC	23ITL201	Data Structures Laboratory	0	0	3	1.5	100	AD, AM, CS, IT, SC
SEC	23CSL201	IT Practices Laboratory	0	0	4	2	100	AD, AM, CS, IT, SC
SEC	23ESL201	Professional Skills 1: Problem solving skills & Logical Thinking 1	0	0	2	1	100	All
VAC	23VAT201	தமிழரும்தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	100	All
Multidisciplinary	23CHT202	Environmental Sciences	1	0	0	-	100	All
AEC	23SAL201	Studio Activities	0	0	2	-	-	All
		Total	**13**	**0**	**20**	**21**	**1000**	

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Programme: B.Tech. Artificial Intelligence and Data Science
2023 Regulations (From 2024 Batch Onwards)
Curriculum for Semester I to VIII

Type of Course	Course Code	Course Title	Duration	Credits	Marks
VAC	23VAL101	Induction Program	3 Weeks	-	100

Semester I

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI101	Communication Skills I	2	0	2	3	100	All
Minor	23MAI103	Linear Algebra and Infinite Series	3	0	2	4	100	AD,AM,CS,IT,SC
Minor	23PHT001	Physics for Information Sciences	3	0	0	3	100	AD,AM,CS,IT,SC
Major	23CST101	Problem Solving using C	3	0	0	3	100	AD,AM,CS,IT,SC
Multidisciplinary	23EEI102	Introduction to Electrical and Electronics Engineering	3	0	2	4	100	AD,AM,CS,IT,SC
Minor	23PHL001	Physics for Information Sciences Laboratory	0	0	3	1.5	100	AD,AM,CS,IT,SC
SEC	23CSL101	Problem Solving using C Laboratory	0	0	3	1.5	100	AD,AM,CS,IT,SC
VAC	23VAL102	Wellness for Students	0	0	2	1	100	All
VAC	23VAT101	தமிழர்மரபு /Heritage of Tamils	1	0	0	1	100	All
AEC	23SAL101	Studio Activities	0	0	2	-	-	All
		Total	**15**	**0**	**16**	**22**	**900**	

Semester II

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
AEC	23ENI201	Communication Skills II	2	0	2	3	100	All
	23FLT201	Foreign Language- Japanese	3	0	0			
	23FLT202	Foreign Language- German	3	0	0			
Minor	23MAI203	Calculus and Transforms	3	0	2	4	100	AD, AM, CS, IT,SC
Major	23ITT201	Data Structures	3	0	0	3	100	AD, AM, CS, IT,SC
Multidisciplinary	23EEI201	Digital System Design	2	0	2	3	100	AD, AM, CS, IT,SC
Multidisciplinary	23MEL001	Engineering Drawing	1	0	3	2.5	100	AD,AM,CS,EA, EC,EE,EV,IT,SC
SEC	23ITL201	Data Structures Laboratory	0	0	3	1.5	100	AD, AM, CS, IT,SC
SEC	23CSL201	IT Practices Laboratory	0	0	4	2	100	AD, AM, CS, IT, SC
SEC	23ESL201	Professional Skills 1: Problem solving skills & Logical Thinking 1	0	0	2	1	100	All
VAC	23VAT201	தமிழரும்தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	100	All
Multidisciplinary	23CHT202	Environmental Sciences	1	0	0	-	100	All
AEC	23SAL201	Studio Activities	0	0	2	-	-	All
		Total	**13**	**0**	**20**	**21**	**1000**	

Passed in 5th Board of Studies Meeting held on 28.12.2023
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BOS Chairman

Semester III

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23MAT306	Probability and Statistics for Data Science	3	1	0	4	100	-
Major	23CST301	Design and Analysis of Algorithms	3	1	0	4	100	AD & CS
Minor	23CST302	Computer Architecture	3	0	0	3	100	AD & CS
Major	23CSI301	Database Systems	3	0	2	4	100	AD & CS
Major	23ADL301	Internet Programming Tools Laboratory	1	0	3	2.5	100	-
Major	23ADL302	Problem Solving using Java Programming Laboratory	1	0	3	2.5	100	-
SEC	23ESL301	Professional Skills 2: Problem solving skills & Logical Thinking 2	0	0	2	1	100	ALL
VAC	23VAT301	Universal Human Values 2: Understanding Harmony	2	1	0	3	100	ALL
AEC	23SAL301	Studio Activities	0	0	2	-	-	ALL
		Total	**16**	**3**	**12**	**24**	**800**	

Semester IV

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23MAT403	Discrete Mathematics for Artificial Intelligence	3	1	0	4	100	-
Major	23ADT401	Artificial Intelligence –I	3	0	0	3	100	-
Major	23ADT402	Foundations of Data Science	3	0	0	3	100	-
Major	23ADT403	Operating System Principles	3	0	0	3	100	-
Major	23ADI401	Data Communication and Networks	3	0	2	4	100	-
Major	23ADL401	Intelligent systems - I Laboratory	0	0	3	1.5	100	-
Major	23ADL402	Problem Solving using Python Laboratory	1	0	3	2.5	100	-
SEC	23ESL401	Professional Skills 3: Professional Development and Etiquette	0	0	2	1	100	ALL
AEC	23SAL401	Studio Activities	0	0	2	-	-	ALL
		Total	**16**	**1**	**12**	**22**	**800**	

Type of Course	Course Code	Course Title	Duration	Credits	Marks
Internship	23XXXXXX	Internship – 1 / Community Internship / Skill Development Program	2 Weeks	1	100

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BOS Chairman

Tentative Curriculum for Semester V to VIII

Semester V

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23ADT501	Artificial Intelligence –II	3	0	0	3	100	-
Major	23ADI501	Exploratory Data Analysis	3	0	2	4	100	-
Major	23ADT502	Cyber Security	3	0	0	3	100	-
Major	23XXXXX	Professional Elective – I	3	0	0	3	100	-
Major	23XXXXX	Professional Elective – II	2	0	2	3	100	-
SEC	23ADL502	Intelligent systems -II Laboratory	0	0	4	2	100	-
SEC	23ESL501	Professional Skills 4: Communication Skills and Interview Essentials	0	0	2	1	100	ALL
Project	23XXXXX	Reverse Engineering Project	1	0	4	3	100	ALL
AEC	23SAL501	Studio Activities	0	0	2	-	-	ALL
		Total	**15**	**0**	**18**	**22**	**900**	

Semester VI

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23ADI601	Big Data Analytics Techniques	3	0	0	3	100	-
Major	23ADI602	Deep Learning Techniques	3	0	2	4	100	-
Major	23XXXXX	Professional Elective – III	3	0	0	3	100	-
Major	23XXXXX	Professional Elective – IV	2	0	2	3	100	-
Minor	23XXXXX	Open Elective – I	3	0	0	3	100	-
SEC	23ADL601	Cloud Technologies Laboratory	1	0	4	3	100	-
SEC	23ESL601	Professional Skills 5	0	0	2	1	100	ALL
AEC	23SAL601	Studio Activities	0	0	2	-	-	ALL
		Total	**15**	**0**	**14**	**20**	**700**	

Type of Course	Course Code	Course Title	Duration	Credits	Marks
Internship	23XXXXXX	Internship – 2/ Research Internship / Skill Development Program	2 / 4 Weeks	1	100

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Semester VII

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23ADT701	Computational Foundation for Robotics	3	0	0	3	100	-
Major	23ADI701	Data security	3	0	2	4	100	-
Major	23XXXXX	Professional Elective – V	3	0	0	3	100	-
Major	23XXXXX	Professional Elective – VI	2	0	2	3	100	-
Minor	23XXXXX	Open Elective – II	3	0	0	3	100	-
SEC	23ADL701	Business Intelligence and Analytics Laboratory	0	0	4	2	100	-
Project	23XXXXX	Project Phase-I	0	0	8	-	100	-
		Total	**14**	**0**	**20**	**18**	**800**	

Semester VIII

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Project	23XXXXX	Project Phase-II	0	0	20	10	200	-
Internship	23XXXXX	Internship-3 / Skill Development Program	8 / 16 Weeks			4	100	-
		Total	**0**	**0**	**20**	**14**	**300**	

Total Credits: 165

Passed in 5th Board of Studies Meeting held on 28.12.2023
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BOS Chairman

Vertical wise Electives

Vertical I Security Essentials Electives								
Type of Course	**Course Code**	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
			L	**T**	**P**			
Major	23ADE001	Ethics in Artificial Intelligence	3	0	0	3	100	-
Major	23ADE002	Ethical Hacking	3	0	0	3	100	-
Major	23ADE003	Web Application Security	3	0	0	3	100	-
Major	23ADE004	Fundamentals of Computation	3	0	0	3	100	-
Major	23ADE001	Cryptographic Techniques in Network Security	2	0	2	3	100	-
Major	23ADE002	Blockchain Technology	2	0	2	3	100	-
Major	23ADE003	Network and Web Security	2	0	2	3	100	-
Major	23ADE004	Digital Forensics	2	0	2	3	100	-

Vertical II Full Stack Development Electives								
Type of Course	**Course Code**	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
			L	**T**	**P**			
Major	23ADE005	User Interface Design Principles	3	0	0	3	100	-
Major	23ADE006	Visual Data Analysis	3	0	0	3	100	-
Major	23ADE007	Computational Vision	3	0	0	3	100	-
Major	23ADE008	Cloud Services Management	3	0	0	3	100	-
Major	23ADE005	Full Stack Programming	2	0	2	3	100	-
Major	23ADE006	Game Designing Techniques	2	0	2	3	100	-
Major	23ADE007	Augmented reality for AI	2	0	2	3	100	-
Major	23ADE008	Security and Privacy in Cloud	2	0	2	3	100	-

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BOS Chairman

Vertical III Software Project Management Electives								
Type of Course	**Course Code**	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
			L	**T**	**P**			
Major	23ADE009	Object Oriented Software Development	3	0	0	3	100	-
Major	23ADE010	Software Development Project Management	3	0	0	3	100	-
Major	23ADE011	Software Quality Management	3	0	0	3	100	-
Major	23ADE012	Reliability Engineering and system safety	3	0	0	3	100	-
Major	23ADE009	Agile Software Development Program	2	0	2	3	100	-
Major	23ADE010	Basic Skills in Integrated Product Development	2	0	2	3	100	-
Major	23ADE011	Design Patterns Concepts	2	0	2	3	100	-
Major	23ADE012	Marketing Analytics	2	0	2	3	100	-

Vertical IV Data Analytics Electives								
Type of Course	**Course Code**	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
			L	**T**	**P**			
Major	23ADE013	Data Analytics for Engineers	3	0	0	3	100	-
Major	23ADE014	Business Analytics Management	3	0	0	3	100	-
Major	23ADE015	Health Care Analytics	3	0	0	3	100	-
Major	23ADE016	Graph Analytics and Algorithm	3	0	0	3	100	-
Major	23ADE013	Social Graph Analytics	2	0	2	3	100	-
Major	23ADE014	Recommendation Systems	2	0	2	3	100	-
Major	23ADE015	Text and Speech Analysis	2	0	2	3	100	-
Major	23ADE016	Image and Video Analytics	2	0	2	3	100	-

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BOS Chairman

Vertical V Emerging Technologies Electives								
Type of Course	**Course Code**	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
			L	**T**	**P**			
Major	23ADE017	Fuzzy Logic and Neural Computing	3	0	0	3	100	-
Major	23ADE018	Optimization Techniques	3	0	0	3	100	-
Major	23ADE019	Information Retrieval Methods	3	0	0	3	100	-
Major	23ADE020	Reinforcement Learning	3	0	0	3	100	-
Major	23ADE017	Fundamentals of Virtualization	2	0	2	3	100	-
Major	23ADE018	Natural Language Processing Systems	2	0	2	3	100	-
Major	23ADE019	Bio Inspired Algorithms	2	0	2	3	100	-
Major	23ADE020	Edge Computing	2	0	2	3	100	-

Vertical VI Applied Robotics Electives								
Type of Course	**Course Code**	**Course Title**	**Hours/Week**			**Credits**	**Marks**	**Common to Programmes**
			L	**T**	**P**			
Major	23ADE021	Drone Technologies	3	0	0	3	100	-
Major	23ADE022	Agricultural Robotics	3	0	0	3	100	-
Major	23ADE023	Robot Operating Systems	3	0	0	3	100	-
Major	23ADE024	Collaborative Robotics	3	0	0	3	100	-
Major	23ADE021	Sensors and Instrumentation	2	0	2	3	100	-
Major	23ADE022	Embedded Computing Systems	2	0	2	3	100	-
Major	23ADE023	Robotic Automation technology	2	0	2	3	100	-
Major	23ADE024	Mobile Robotics	2	0	2	3	100	-

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BOS Chairman

Diversified Electives

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Major	23XXXXX	Cyber security	3	0	0	3	100	-
Major	23XXXXX	Research Methodology	3	0	0	3	100	-
Major	23XXXXX	Project Management	3	0	0	3	100	-
Major	23XXXXX	Business and Sustainable Development	3	0	0	3	100	-

Open Electives (Offered to other Programmes)

Type of Course	Course Code	Course Title	Hours/Week			Credits	Marks	Common to Programmes
			L	T	P			
Minor	23ADO001	Data Mining and Warehousing	3	0	0	3	100	-
Minor	23ADO002	Data Science for Engineers	3	0	0	3	100	-
Minor	23ADO003	Business Analytics	3	0	0	3	100	-
Minor	23ADO004	Cognitive Science	3	0	0	3	100	-
Minor	23ADO005	Total Quality Management Principles	3	0	0	3	100	-
Minor	23ADO006	Professional Ethics	3	0	0	3	100	-
Minor	23ADO007	Ethical Hacking Essentials	3	0	0	3	100	-
Minor	23ADO008	Data Visual Exploration	3	0	0	3	100	-
Minor	23ADO009	Foundations of Marketing Analytics	3	0	0	3	100	-
Minor	23ADO010	Information Extraction and Text Mining	3	0	0	3	100	-
Minor	23ADO011	Drone Technology	3	0	0	3	100	-
Minor	23ADO012	Agri-Robotics	3	0	0	3	100	-

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024

BOS Chairman

Course Code:23VAL101		Course Title: Induction Program (Common to all B.E/B.Tech Programmes)
Course Category: VAC		Course Level: Introductory
Duration: 3 weeks	Mandatory Non- Credit Course	Max Marks:100

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Explain various sources available to meet the needs of self, such as personal items and learning resources
2. Explain various career opportunities, opportunity for growth of self and avenues available in the campus
3. Explain the opportunity available for professional development
4. Build universal human values and bonding amongst all the inmates of the campus and the society.

List of Activities:

1. History of Institution and Management: Overview on NIA Educational Institutions – Growth of MCET – Examination Process –OBE Practices –Code of Conduct – Centre ofExcellence.
2. Lectures, interaction sessions and Motivational Talks by Eminent people, Alumni, Employer and Industry Experts
3. Familiarisation of Department / Branch:HoD's & Senior Interaction- Department Association
4. Universal Human Value Modules: Aspirations and concerns, Self-Management, Relations Social and Natural Environment.
5. Orientation on Professional Skills Courses
6. Proficiency Modules : Mathematics, English, Physics and Chemistry
7. Introduction to various Chapters, Cells, Clubs and its events
8. Creative Arts : Painting, Music and Dance
9. Physical Activity :Games, Sports and Yoga
10. Group Visits: Visit to local area and Campus Tour

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1 : Explain various sources available to meet the needs of self, such as personal items and learning resources through visit to local areas and campus	Understand
CO2: Explain various career opportunities and avenues available in the campus through orientation sessions	Understand
CO3: Explain the opportunity available for professional development through professional skills, curricular, co-curricular and extracurricular activities	Understand
CO4: Build universal human values and bonding amongst all the inmates of the campus and society for having a better life	Apply

Course Articulation Matrix

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

High : 3, Medium :2, Low: 1

Text Book(s):

T1. Reading material, Workbook prepared by PS team of the college

Reference Book(s):

R1. Sean Covey, “Seven habits of highly effective teenagers”, Simon & Schuster Uk, 2004.

R2. Vethathiri Maharishi Institute For Spiritual and Intuitional Education, aliyar, “value educatharmonious life (Manavalakalai Yoga)”, Vethathri Publications, Erode, 2010.

R3. Dr.R.Nagarathna, Dr.H.R. Nagendra, “ Integrated approach of yoga therapy for positiveSwami Vivekananada Yoga Prakashana Bangalore,2008 Ed.

Web References:

1. https://youtube.com/playlist?list=PLYwzG2fd7hzc4HerTNkc3pS_IvcCfKznV
2. https://www.youtube.com/watch?v=P4vjfEVk&list=PLWDeKF97v9SO0frdgmpaghDMjkom1
3. https://fdp-si.aicte-india.org/download/AboutSIP/About%20SIP.pdf

Course Code: 23ENI101	Course Title: Communication Skills I (Common to all B.E/B.Tech Programmes)		
Course Category: AEC		Course Level: Introductory	
L:T:P(Hours/Week) 2:0:2	Credits: 3	Total Contact Hours:60	Max Marks:100

Course Objectives

The course is intended to impart formal and informal language effectively and accurately in various real-life contexts on par with B1 level of CEFR Scale.

Module I **20 Hours**

Grammar: Synonyms & Antonyms -Tense forms - Modals - Passives – Reported Speech – Comparatives and Descriptive adjectives.

Listening: Listening for gist and specific information - Listening to past events, experiences and job preferences - Listening to descriptions of monuments- Listening for excuses - Listening to description: transportation systems and public places.

Speaking: Introducing oneself - Exchanging personal information – Effective Conversations: Role Play Situations (Describing personality traits - Describing landmarks, monuments and festivals - Making polite requests and excuses - Discussing facts - Asking for and giving information – Expressing wishes - Talking about lifestyle changes - Talking about transportation and its problems - Describing positive and negative features of things and places - Making comparisons)

Reading: Skimming and Scanning - Reading Comprehension - Reading and comprehending online posts and emails – Case Studies

Writing: Letter writing (Permission letters - Online cover letter for job applications) - Instructions - Recommendations - Write a blog (General) - Report Writing (Industrial Visit Report and Event Reports) - formal and informal emails.

Module II **20 Hours**

Grammar: Sequence adverbs - Phrasal verbs - Relative clauses – Imperatives – Infinitives Conditionals.

Listening: Listening to review of food items - Listening to results of surveys- Listening to motivational talks & podcasts

Speaking: Expressing likes and dislikes - Describing a favourite snack - Giving advices and suggestions - Speculating about past and future Events – Group Discussion

Reading: Reading different expository texts - Reading to factual texts - Print and online media- Reading Comprehension.

Writing: Process Descriptions – Email Writing (Requesting for information) - Reviewing Movie –Social media feeds/posts (Any Social Media)

List of Experiments: **20 Hours**

1. Mini Presentation and Picture Prompt Discussion
2. Debate Tournament
3. Listening, Mind Mapping & Summarization
4. Listening to Stories and Providing the Innovative Climax
5. Reading Comprehension
6. Writing - Interpretation of Visuals

Course Outcomes	**CognitiveLevel**
At the end of this course, students will be able to:	
CO1: Utilize the basic English grammar and vocabulary to acquire professional communication skills.	Apply
CO2: Develop listening and speaking skills through classroom activities based on listening comprehension, recapitulation, interpretation and debate on the same	Apply
CO3: Read and write social media posts and comments	Apply
CO4: Perform as a member of a team and engage in individual presentation	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Textbook(s):

T1. Jack C. Richards, Jonathan Hull, and Susan Proctor, “Interchange - Student’s book 2”,5th Edition, Cambridge University Press, South Asia Edition, 2022.

T2. Jack C. Richards, Jonathan Hull, and Susan Proctor, “Interchange - Student’s Book 1”, 5th Edition, Cambridge University Press, South Asia Edition, 2022.

Reference Book(s):

R1. David Bohlke, Jack C. Richards, “Four Corners”, 2nd Edition, Cambridge University Press,2018.

R2. Adrian Doff, Craig Thaine, Herbert Puchta, Jeff Stranks, Peter Lewis-Jones, Graham Burton,Empower B1 – Student’s Book, Cambridge University Press, 2020.

R3. Raymond Murphy, “Intermediate English Grammar” 30th Edition, Cambridge University Press,2022.

Web References:

1. https://speakandimprove.com/
2. https://writeandimprove.com/
3. https://www.cambridgeenglish.org/exams-and-tests/linguaskill/

Course Code: 23MAI103		Course Title: Linear Algebra and Infinite Series (Common to AD, AM, CS, IT & SC)	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week)3:0:2	Credits: 4	Total Contact Hours: 75	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on Linear Algebra, vector spaces, sequences and series in mathematics to have a strong foundation in science and engineering.

Module I **23 Hours**

Solutions to System of Linear Algebraic Equations: Matrices- Rank of a matrix - Consistency of a system of linear equations- Row echelon form-Row reduced echelon form-Gauss elimination method- Crout's method.

Basis and Dimension of Vector Spaces: Vector spaces -Linear Independent and dependent of vectors-Basis, dimension, row space, column space, null space, rank nullity theorem.

Orthogonality and Inner Product Space: Inner product of vectors-Inner product spaces-length of a vector, distance between two vectors, orthogonality of vectors-orthogonal projection of a vector-Gram-Schmidt process- orthonormal basis.

Module II **22 Hours**

Eigen Values and Eigen Vectors: Eigen values and vectors-symmetric, skew symmetric and orthogonal matrices- Diagonalization of matrix through orthogonal transformation-Reduction of quadratic forms to canonical form-rank ,index, signature and nature of quadratic forms-Singular Value decomposition.

Sequences and Series: Sequences-definitions and examples- Series-Tests for convergence-comparison test, integral test, Cauchy's root test, Alembert's ratio test-Alternating series –Leibnitz's test.

List of Experiments: **30 Hours**

1. Introduction to MATLAB
2. Row Echelon form and Row reduced Echelon form of a matrix.
3. Rank of a matrix and solution of a system of linear equations
4. Dimension of row space, column space and null space.
5. Gram-Schmidt Orthogonalization.
6. Eigenvalues and Eigenvectors of matrices.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply matrix techniques for solving system of linear equations and apply the process of orthogonalization to find orthogonal vectors.	Apply
CO2: Determine the canonical form of a quadratic form using orthogonal transformation in Science and Engineering problem solving.	Apply
CO3: Apply different tests to find convergence and divergence of series in the problem solving.	Apply
CO4: Demonstrate the understanding of linear algebra concepts through modern tool.	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley & sons, 2010.

T2. David C Lay, Linear Algebra and its Applications, 3rd edition, Pearson India, 2011.

T3. Howard Anton, Chris Rorres, Elementary Linear Algebra Applications version,11th edition, Wiley India edition, 2013.

Reference Book(s):

R1. T. Veerarajan, Engineering Mathematics for first year, 3rd edition, Tata McGraw-Hill, 2019.

R2. V. Krsihnamurthy, V. P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East-West press, Reprint 2005.

R3. P. Sivaramakrishna Das , C. Vijayakumari , Engineering Mathematics, Pearson India, 2017.

Web References:

1. https://nptel.ac.in/courses/111106051
2. https://www.classcentral.com/course/matrix-algebra-engineers-11986

Course Code: 23PHT001		Course Title: Physics for Information Sciences (Common to AD, AM, CS, IT & SC)	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week)3: 0: 0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart the knowledge on working mechanism of laser, fiber optics, display devices and introduce the concepts of integrated circuits, nanotechnology and quantum computing

Module I **22 Hours**

Laser: Characteristics of laser light- Einstein's theory of matter and radiation – A & B Coefficients- Stimulated and spontaneous emission of radiation - Population inversion and pumping methods – Types of laser: Nd: YAG laser and Carbon di oxide (CO_2) molecular gas laser - Semiconductor laser (Homo junction and hetero junction) – Applications: Hologram and Holographic data storage (record/read).

Fiber Optics: Optical fibers – Principle of light propagation through optical fibers - Expressions for numerical aperture and acceptance angle - Types of optical fibers based on material, refractive index, and mode of propagation- Fabrication of optical fiber: Double crucible method- Dispersion and attenuation in optical fiber - Photo detectors: PN, PIN & Avalanche photo diodes- Fiber optic communication system and its advantages.

Nano Technology: Introduction – Importance of Nanotechnology – Nanomaterials – Nanoparticles – Synthesis of Nanoparticles: High- energy ball milling (top-down approach) – Sol-gel process (bottom-up approach) – Application of Nanomaterials.

Module II **23 Hours**

Quantum Computing: Introduction to Quantum Computing - Uses and Benefits of Quantum Computing - Features of Quantum Computing: Superposition, Entanglement, Decoherence - Limitations of Quantum Computing – Comparison of Quantum Computer with Classical Computer - Quantum Computers in Development: Google, IBM, Microsoft and others.

Integrated Circuits: Introduction to semiconductors: Intrinsic and extrinsic Semiconductors- Advantages of Integrated circuits (ICs) over discrete components- IC classification- Construction of bipolar transistor: Silicon Wafer Preparation - Epitaxial growth - Oxidation- Photolithography- Isolation diffusion - Base diffusion - Emitter diffusion

- Contact mask- Aluminium metallization – Passivation- Structures of integrated PNP transistor.

Display Devices: Human vision - Red, Blue, and Green (RGB) color scheme – Primary and secondary colors- Color addition and subtraction-Optical Emissions: Luminescence, photoluminescence, cathodoluminescence- electroluminescence -Injection electro Luminescence- Displays (Working principles): Plasma display, LED display, Liquid crystal display (LCD) and Numeric display.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Apply the basic concepts of laser, fiber optics and nanotechnology to solve different optical parameters.	Apply
CO2: Perform as a member of team in analyzing the concepts of laser, fiber optics and nanotechnology involved in engineering applications related to science and technology and make a presentation.	Apply
CO3: Interpret the concepts of nanomaterials, IC fabrication techniques and display devices and apply it for different real-life applications.	Apply
CO4: Perform as a member of team in articulating the modern technologies behind nanotechnology, integrated circuits and display devices.	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. M. N. Avadhanulu and P. G. Kshirsagar, “Text Book of Engineering Physics”, S. Chand & Company Ltd., New Delhi, 2018.

T2. David Armitage, “Introduction to Micro displays”, John Wiley & Ltd, 2006.

T3. D. Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd, 3rd Edition, 2010

Reference Book(s):

R1. D. Halliday., R. Resnick and J. Walker, “Fundamentals of Physics”, Wiley Publications, 10th Edition, 2014.

R2. Ajoy Ghatak, “Optics”, Tata McGraw-Hill Education, New Delhi, 5th Edition, 2012.

R3. A. Marikani, “Engineering Physics”, PHI Learning, New Delhi, 2nd Edition, 2014.

Web References:

1. https://onlinecourses.nptel.ac.in/noc22_ph32/preview
2. http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
3. https://www.investopedia.com/terms/q/quantum-computing.asp

Course Code: 23CST101		Course Title: Problem Solving using C (Common to AD,AM,CS,IT&SC)	
Course Category: Major		Course Level: Introductory	
L:T:P(Hours/Week)3: 0: 0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives: The course is intended to impart knowledge on basic concepts of C.

Module I **23 Hours**

C Programming Basics: General Problem solving strategy – Program development cycle - Problem Solving Techniques : Algorithm, Pseudocode and Flow Chart - Overview of C –Structure of C program — C Character set — keywords - Identifiers — Variables and Constants — Data types — typedef- Type conversion — Operators and Expressions — Managing formatted and unformatted Input & Output operation.

Control Structures: Storage classes - Statements: Selection statements - Jump statements - Iteration statements.

Arrays: Characteristics of Array – Single-dimensional array – Two-dimensional array – Array Operations – Applications: Linear search, Selection sort, Matrix Operations.

Functions: Declaration & Definition – Return statement – Classification of functions – Parameter passing methods: call by value — call by reference — Passing Array to a Function– Returning Array from a function – Recursion.

Module II **22 Hours**

Strings: Declaration and Initialization of string – Display of strings with different formats – String library Functions — String conversion functions.

Pointers: Features - Types of Pointers: Null and Void pointer – Operations on pointers – Pointers to an Array.

Structures: Declaration & Initialization of Structures – Structure within Structure – Array of Structures — Pointer to Structures.

Union: Declaration & Initialization of Union – Enumerations.

Files: Introduction to Files – Streams and File Types – File operations (Open, close, read, write) — Command line arguments.

Preprocessor Directives: Macro Expansion, File Inclusion, Conditional Compilation.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Understand the fundamental concepts of programming, such as variables, data types, control structures, and functions.	Understand
CO2: Design and develop C programs for real-world applications	Apply
CO3: Apply problem-solving skills and knowledge of c programming constructs to solve a given problem	Apply
CO4: Analyze and debug C programs to identify and fix errors.	Analyze
CO5: Apply modular programming techniques to break dowr complex programs into smaller, manageable modules	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Yashavant P.Kanetkar, “Let Us C”, 19th Edition, BPB Publications, 2022.

T2. Ashok N.Kamthane, Amit.N.Kamthane, “Programming in C”, 3rd Edition, Pearson Education, 2015.

Reference Book(s):

R1. Ajay Mittal, “Programming in C - A Practical Approach”, 3rd Edition, Pearson Education, 2010.

R2. Brian W.Kernighan and Dennis M.Ritchie,”The C Programming Language” 2nd Edition, Pearson Education, 2015.

R3. Venit S, and Drake E, “Prelude to Programming Concepts and Design”, 6th Edition, Pearson Education, 2014

R4. Pradip Dey, Manas Ghosh, “Computer Fundamentals and Programming in C”, 2nd Edition, Oxford University Press, 2013.

Web References:

1. http://www.cprogramming.com/

2. http://www.c4learn.com/

Course Code: 23EEI101	Course Title: Basics of Electrical and Electronics Engineering (Common to AD, AM, CS, IT and SC) (2023 Batch Only)		
Course Category: Multidisciplinary	Course Level: Introductory		
L:T:P(Hours/Week)3: 0: 2	Credits:4	Total Contact Hours:75	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on engineering fundamentals of DC&AC circuits, Electrical machines, Electron devices, Carpentry and plumbing.

Module I **22 Hours**

Fundamentals of DC Circuits: Definition, symbol and unit of quantities – Active and Passive elements – Ohm's Law: statement, – Kirchhoff's Laws: statement and illustration – Resistance in series and voltage division rule – Resistance in parallel and current division rule – Star to Delta and Delta to Star transformation- circuit simplification.

AC Fundamentals: Magnetic Circuits: Definition of magnetic quantities — Law of electromagnetic induction – Generation of single phase alternating EMF – Terminology – 3Phase System: 3-Wire and 4 Wire system – Root Mean Square (RMS) – Average value of AC

DC Machines: DC Generator and DC Motor: Construction, Working Principle.

Module II **23 Hours**

AC Machines: Single phase transformer: Construction, working principle - Single phase induction motor: Capacitor start and run -Three phase induction motor: An introduction.

Semiconductor Devices: Theory of Semiconductor: PN junction diode, Forward Bias Conduction, Reverse Bias Conduction, V-I Characteristics — Bipolar Junction Transistor: Operation of NPN and PNP Transistor, Common Emitter Configuration — MOSFET: construction and working principle.

Opto-Electronic Devices and Transducers: Opto-Electronic Devices: Working principle of Photoconductive Cell, Photovoltaic Cell-solar cell Transducers: Capacitive and Inductive Transducer, Thermistors, Piezoelectric and Photoelectric Transducer.

List of Experiments **30 Hours**

Electrical & Electronics:

1) Identification of resistor and capacitor values
2) Soldering practice of simple circuit and checking the continuity
3) Fluorescent tube, staircase and house wiring
4) Characteristics of PN Diode

Civil & Mechanical:

1) Make a wooden Tee joint to the required dimension
2) Make a tray in sheet metal to the required dimension
3) Assemble the pipeline connections with different joining components for the given layout

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Apply the basic laws and simplification techniques of electrical Engineering in DC and AC Circuits.	Apply
CO2: Summarize the construction and working of Motors, Generator and transformer.	Understand
CO3: Analyze the characteristics of diodes and transistors based on its construction and working principle.	Analyze
CO4: Summarize the working of opto-electronic devices and transducers	Understand
CO5: Examine and report the analysis of different resistors, capacitors, house wiring concepts, wooden joints and pipeline connection.	Analyze

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Textbook(s):

T1. R. Muthusubramanian and S.Salivahanan, “Basic Electrical and Electronics Engineering”, McGraw Hill India Limited, New Delhi, 2014.

T2. S. K. Sadhev, “Basic Electrical Engineering and Electronics”, Tata Mcgraw Hill, 2017.

Reference Book(s):

R1. B.L Theraja, “Fundamental of Electrical Engineering and Electronics”, S.Chand Limited, 2022.

R2. J.B.Gupta, “Basic Electrical and Electronics Engineering”, S.K.Kataria & Sons, 2013.

R3. Smarajit Ghosh, “Fundamental of Electrical and Electronics Engineering”, 2nd Edition, PHI Learning Private Limited New Delhi, 2010.

Web References:

1. https://www.nptel.ac.in/courses/108108076
2. https://archive.nptel.ac.in/courses/108/105/108105112
3. https://archive.nptel.ac.in/courses/108/101/108101091

Course Code: 23EEI102	**Course Title: Introduction to Electrical and Electronics Engineering (Common to AD, AM, CS, IT & SC) (From 2024 Batch Onwards)**		
Course Category: Multidisciplinary		**Course Level: Introductory**	
L:T:P(Hours/Week): 3: 0: 2	**Credits:4**	**Total Contact Hours:75**	**Max Marks:100**

Course Objectives:

The course is intended to impart knowledge on engineering fundamentals of electric circuits, Electrical machines, and Electron devices.

Module I **23 Hours**

Fundamentals of DC Circuits: Definition, symbol and unit of quantities – Active and Passive elements – Ohm's Law: statement, – Kirchhoff's Laws: statement and illustration – Resistance in series and voltage division rule – Resistance in parallel and current division rule –circuit simplification.

AC Fundamentals: AC Terminologies – Law of electromagnetic induction – Generation of single phase alternating EMF – Root Mean Square (RMS) – Average value of AC

Electrical Machines: Construction and Working Principle of DC shunt Motor, Stepper Motor and single phase transformer

Module II **22 Hours**

Semiconductor Devices: PN junction diode, Forward Bias Conduction, Reverse Bias Conduction, V-I Characteristics – Half wave and Full wave rectifier using diodes – SMPS – UPS - Bipolar Junction Transistor: Operation of NPN and PNP Transistor, Common Emitter Configuration

Opto-Electronic Devices and Transducers: Opto-Electronic Devices: Working principle of Photoconductive Cell, Photovoltaic Cell – LED&LCD display - Thermistors, Thermocouple, and Piezoelectric Transducers.

Fuses – Circuit breaker: MCB, MCCB – Energy efficiency star rating.

List of Experiments **30 Hours**

1. Identification of resistor and capacitor values.
2. Soldering practice of simple circuit and checking the continuity.
3. Staircase and house wiring.
4. Characteristics of PN Diode.
5. Half wave and full wave rectifier using diodes.
6. Characteristics of CE configuration transistor.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Apply the basic laws and simplification techniques in electrical engineering using electric circuits.	Apply
CO2: Make use of the basic laws and principles of electric circuits in analysis of the electrical machines viz., Motors & transformers, UPS and SMPS	Analyze
CO3: Analyse the Diodes, Transistors, Opto-Electronic Devices and Transducers	Analyze
CO4: Investigate and report the analysis of different resistors, capacitors, house-wiring concepts.	Evaluate

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Textbook(s):

T1. R.Muthusubramanian and S.Salivahanan, “Basic Electrical and Electronics Engineering”, McGraw Hill India Limited, New Delhi, 2014.

T2. S. K. Sadhev, “Basic Electrical Engineering and Electronics”, Tata Mcgraw Hill, 2017.

Reference Book(s):

R1. B.L Theraja, “Fundamental of Electrical Engineering and Electronics”, S.Chand Limited, 2006.

R2. J.B.Gupta, “Basic Electrical and Electronics Engineering”, S.K.Kataria & Sons, 2009.

R3. Smarajit Ghosh, “Fundamental of Electrical and Electronics Engineering”, 2nd Edition, PHI Learning Private Limited New Delhi, 2010.

Web References:

1. https://www.nptel.ac.in/courses/108108076
2. https://archive.nptel.ac.in/courses/108/105/108105112
3. https://archive.nptel.ac.in/courses/108/101/108101091

Course Code: 23PHL001		Course Title: Physics for Information Sciences Laboratory (Common to AD, AM, CS, IT & SC)	
Course Category: Minor		Course Level: Introductory	
L:T:P (Hours/Week)0:0:3	Credits:1.5	Total Contact Hours: 45	Max Marks: 100

Course Objectives

The course is intended to expose the students to various experimental skills, which arevery essential for an Engineering student.

List of Experiments: **45 Hours**

1. Determination of wavelength of the Laser using plane transmission grating.
2. Estimation of particle size of fine lycopodium powder using laser.
3. Measurement of acceptance angle and numerical aperture of an optical fiber —Laser diffraction method.
4. Determination of band gap of semiconducting materials — Thermistor(Germanium).
5. Light Illumination characteristics of Light dependent resistor (LDR).
6. Measurement of thickness of thin material – Air wedge method.
7. Determination of wavelength of the spect ral lines of mercury spectrum usinggrating.
8. I-V characteristics of solar cell.
9. I-V characteristics of photo diode.
10. Verification of truth tables of logic gates.
11. Design of logic gates using discrete components.
12. I-V characteristics of LED.

Course Outcomes	CognitiveLevel
At the end of this course, students will be able to:	
CO1: Elucidate the basic principles involved in the given experiments	Understand
CO2: Conduct, analyze and interpret the data and results from physicsexperiment	Evaluate

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

Reference Book(s):

R1. Physics Laboratory Manual Prepared by Faculty of Physics, Dr. Mahalingam College of Engineering and Technology.

R2. Engineering Physics Laboratory Manual, Dr. R. Jayaraman, V. Umadevi, S. Maruthamuthu, B. Saravanakumar, Pearson India Education Services Pvt. Ltd, 2022.

R3. B.Sc., Practical Physics, C.L. Arora, S. Chand and Co, 2012.

Web References:

1. https://bop-iitk.vlabs.ac.in/List%20of%20experiments.html
2. https://vlab.amrita.edu/index.php?sub=1&brch=281
3. https://vlab.amrita.edu/index.php?sub=1&brch=189

Course Code: 23CSL101		Course Title: Problem Solving using C Laboratory (Common to AD,AM,CS,IT&SC)	
Course Category: SEC		Course Level: Introductory	
L:T:P(Hours/Week) 0:0:3	Credits:1.5	Total Contact Hours: 45	Max Marks:100

Course Objectives:

The course is intended to enable the students for writing simple programs in C.

List of Experiments: **45 Hours**

1. Develop Algorithm, Flowchart and Pseudo code for given problem.
2. Develop C programs using data types, I/O statements, Operators and Expressions.
3. Develop C programs using Decision-making constructs.
4. Implement C programs using looping statements.
5. Design C programs to implement the concept of arrays.
6. Design C programs to implement the concept of strings
7. Develop C programs using functions.
8. Develop C programs using pointers.
9. Implement the concept of structures using C.
10. Implement C programs to perform file operations.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Demonstrate proficiency in using development environments, compilers, and debugging tools for C programming	Apply
CO2: Apply C programming concepts to practical programming tasks	Apply
CO3: Demonstrate an understanding of the importance of code efficiency and optimization in C programming	Analyze
CO4: Work as a team in a laboratory environment to develop and demonstrate projects with an oral presentation	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Reference Book(s):

R1. Ashok N.Kamthane, Amit.N.Kamthane, “Programming in C”, 3rd Edition, Pearson Education, 2015.

R2. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Pearson Education, 2013.

R3. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.

R4. ReemaThareja, “Programming in C”, Oxford University Press, 2nd Edition, 2016.

Web References:

1. https://electronicsforu.com/resources/15-free-c-programming-ebooks
2. https://www.fromdev.com/2013/10/c-programming-tutorials.html
3. https://books.goalkicker.com/CBook/

Course Code: 23VAL102		Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes)	
Course Category: VAC		Course Level: Introductory	
L:T:P(Hours/Week) 0: 0 :2	Credits:1	Total Contact Hours:30	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on setting SMART goals for academic, career and life, applying time management techniques, articulating the importance of wellness for success in life and understanding the dimensions of wellbeing and relevant practices.

Module I **15 Hours**

Goal Setting Understanding Vision and mission statements - Writing personal mission statements – „Focus" as a way of life of most successful people. Clarifying personal values, interests and orientations – Awareness of opportunities ahead – Personal SWOT analysis -Principles driving goal setting: Principle of response and stimuli, Circle of influence and circle of concern, what you see depends on the role you assume. Potential obstacles to setting and reaching your goals - Five steps to goals setting: SMART goals, Inclusive goals, Positive stretch, Pain vs gain, Gun-point commitment.

Time Management - Tools and Techniques Importance of planning and working to time. Pareto 80-20 principle of prioritization – Time quadrants as a way to prioritize weekly tasks – The glass jar principle - Handling time wasters – Assertiveness, the art of saying „NO"
– Managing procrastination.

Concept of Wellness – impact of absence of wellness - Wellness as important component to achieve success. Wellbeing as per WHO - Dimensions of Wellbeing: Physical, Mental, Social, Spiritual – indicators and assessment methods

Module II **15 Hours**

Simplified Physical Exercises. Fitness as a subset of Wellness – health related physical fitness - skill related physical fitness. Joint movements, Warm up exercises, simple asanas, WCSC simplified exercises.

Practices for Mental Wellness

Meditation: Mind and its functions - mind wave frequency – Simple basic meditation – WCSC meditation and introspection tables. Greatness of friendship and social welfare – individual, family and world peace – blessings and benefits.

Food & sleep for wellness: balanced diet - good food habits for better health (anatomic therapy) – hazards of junk food - food and the gunas.

Putting Into Practice

Practicals: Using the weekly journal – Executing and achieving short term goals – Periodic reviews.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO 1: Set well-articulated goals for academics, career, and personal aspirations	Apply
CO2: Apply time management techniques to complete planned tasks on time	Apply
CO3: Explain the concept of wellness and its importance to be successful in career and life	Apply
CO4: Explain the dimensions of wellness and practices that can promote wellness	Apply
CO5: Demonstrate the practices that can promote wellness	Valuing

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Reading material, workbook and journal prepared by PS team of the college

Reference Book(s):

R1. Stephen R Covey, “First things first”, Simon & Schuster UK, Aug 1997

R2. Sean Covey, “Seven habits of highly effective teenagers”, Simon & Schuster UK, 2004.

R3. Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar, “Value education for harmonious life (Manavalakalai Yoga)”, Vethathiri Publications, Erode, I Ed. (2010).

R4. Dr. R. Nagarathna, Dr. H.R. Nagendra, “Integrated approach of yoga therapy for positive health”, Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.

R5. Tony Buzan, Harper Collins, “The Power of Physical Intelligence English”

Course Code: 23VAT101	Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

CO.1 மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்ள இயலும்.

CO.2இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்ள இயலும்.

தமிழர் மரபு

அலகு 1 – மொழி மற்றும் இலக்கியம் 3

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

அலகு 2 – மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் 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 3 – நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு 4 – தமிழர்களின் திணைக் கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக் கோட்பாடு – சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5 – இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறபகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுய மரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப் படிகள்– தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
மாணவர்கள் இப்பாடத்தை கற்றபின்	
CO.1 மொழி மற்றும் இலக்கியம், பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை , நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் , திணைக் கோட்பாடுகள் மூலம் தமிழர் மரபை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2 இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பை அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால 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.

Course Code: 23VAT101	Course Title: HERITAGE OF TAMILS (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinai Concept.
2. Understand the Contribution of Tamils to Indian National Movement and Indian Culture.

HERITAGE OF TAMILS

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, Villu Pattu, Kaniyan Koothu, 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

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO.1 Understand the Heritage of Tamils in terms of Language and Literature, Rock Art Paintings to Modern Art – Sculpture, Folk and Martial Arts, Thinai Concept.	Understand
CO.2 Understand the Contribution of Tamils to Indian National Movement and Indian Culture.	Understand

Course Articulation Matrix

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால 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)

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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 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.

Course Code: 23ENI201		Course Title: Communication Skills II (Common to all B.E/B.Tech Programmes)	
Course Category: AEC		Course Level: Introductory	
L:T:P(Hours/Week) 2:0:2	Credits: 3	Total ContactHours:60	Max Marks:100

Course Objectives

The course is intended to impart effective and accurate language in business correspondence on par with B2 level of CEFR Scale.

Module I **20 Hours**

Grammar: Linking Words - Collocations –Sentence Completion - Articles - Adverbs– Indefinite Pronoun

Listening: Listening to short conversations - Listening for gist and summarizing - Listening for detail - Responding to straightforward questions.

Speaking: Making statements of facts - Agreeing and disagreeing to opinions - Respond to queries - Group Discussion.

Reading: Read and select (phrasal verbs & relative clause)- Cloze Test - Gapped sentences - Multiple- choice gap-fill

Writing: Paragraph Writing: Descriptive, narrative, persuasive and argumentative - Emails: Giving information - Making enquiries - Responding to enquiries - Power Point Presentation

Module II **20 Hours**

Grammar: Expressions of cause and result – Concord - Error Spotting (Parts of Speech & Indian English) - Prepositions.

Listening: Listening for identifying main points - Responding to a range of questions about different topics - Listening to identify relevant information

Speaking: Empathetic Enunciation – Situation handling – Visual Interpretation - - Short presentations

Reading: Intensive Reading: Comprehending business articles, reports and proposals and company websites-- Open gap-fill - Extended reading

Writing: Report Writing - Memo – Complaint letter - Business Letters (Seeking permission & Providing Information)

List of Experiments: **20 Hours**

1. Listening to Monologue and Extended Listening Activity I
2. Listening to Monologue and Extended Listening Activity II
3. Expressing Opinions and Situational based speaking
4. Mini Presentation and Visual Interpretation
5. Reading Comprehension
6. Writing letter, email and report

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Identify the common errors in written and spoken correspondence.	Apply
CO2: Develop listening, reading and speaking skills through task based activities in listening, reading comprehension, recapitulation, interpretation and discussion.	Apply
CO3: Read business correspondences like memo, Email, letter, proposals and write reports and website entries and product launches.	Apply
CO4: Perform as an individual and member of a team and engage effectively in group discussion and individual presentation.	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Textbook(s):

T1. Guy Brook- Hart, “Business Benchmark Upper Intermediate”, 2nd Edition, South Asian, Cambridge University Press, 2020.

T2. Norman Whitby, “Business Benchmark pre-intermediate to Intermediate”, 2nd Edition,South Asian, Cambridge University Press, 2014.

Reference Book(s):

R1. Hewings Martin - Advanced Grammar in use Upper-intermediate Proficiency, CUP,3rd Edition,2013.

R2. Clark David – Essential BULATS (Business Language Testing Service), CUP, 2006.

R3. Adrian Doff, Craig Thaine, Herbert Puchta, Jeff Stranks, Peter Lewis-Jones, Rachel Godfrey, Gareth Davies, Empower B1+ – Student's Book, Cambridge University Press,2015.

Web References:

1. https://speakandimprove.com/
2. https://writeandimprove.com/
3. https://www.cambridgeenglish.org/exams-and-tests/linguaskill/

Course Code:23FLT201		Course Title: Foreign Language - Japanese (Common to all B.E/B.Tech Programmes)	
Course Category: AES		Course Level: Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Course Objectives:

The course objectives intended to:

1. Express a basic exposure on Japanese language and culture
2. Express thoughts and communicate in the beginner level of Japanese with native Japanese speaker
3. Identify the kanji etymology as well as use it in basic vocabulary required for the JLPT / NAT 5 examination level
4. Read and write 100 kanji of the official JLPT N5
5. Choose the appropriate verb forms for learning and practicing the Japanese language

UNIT I Introduction to Japan and greetings 9 Hours

Japan : Land and culture - Introduction to Japanese language – Greetings – Seasons - Days of the week - Months of the year – Dates of the month - Self introduction – Numbers (Upto 99,999) – Expressing time – Conversation audio and video.

Listening: Listening to Greetings - Listening for Specific Information: Numbers, Time. Speaking: Self-Introduction

UNIT II Building vocabulary 9 Hours

Family relationships - Colours - Parts of body - Profession - Directions - Time expressions (today, tomorrow, yesterday, day before, day after) - Japanese housing and living style - Food and transport (vocabulary) - Stationery, fruits and vegetables

Listening: Listening for Specific Information: Directions, Family Members, Parts of body Speaking: Introducing one's family.

UNIT III Writing systems 9 Hours

Hiragana Chart 1 - vowels and consonants and related vocabulary – Hiragana Charts 2&3, double consonants, vowel elongation and related vocabulary – Introduction to Kanji – Basic Vocabulary – Basic Conversational Phrases.

Listening: Listening to Japanese Alphabet Pronunciation, Simple Conversation. Speaking: Pair Activity (Day to day situational conversation)

UNIT IV Kanji and preposition 9 Hours

Katakana script and related vocabulary – Basic kanjis: naka, ue, shita, kawa , yama , numbers (1- 10, 100, 1000, 10,000 and yen) , person, man, woman, child, tree , book , hidari, migi, kuchi , 4 directions - Usage of particles wa, no, mo and ka and exercises - Usage of kore, sore, are, kono, sono, ano, arimasu and imasu - Particles – ni (location) and ga , donata and dare - Particles ni (time), kara, made , ne , koko, soko, asoko and doko - Directions : kochira, sochira, achira and dochira , associated vocabulary (mae, ushiro, ue, shita, tonari, soba, etc.)

Listening: Listening to conversation with related particles

UNIT V Verb forms 9 Hours

Introduction to Verbs - Verbs –Past tense, negative - i-ending and na-ending adjectives introduction - ~masen ka, mashou - Usage of particles de, e , o, to, ga(but) and exercises - Adjectives (present/past – affirmative and negative) – Counters - ~te form

Listening: Listening to different counters, simple conversations with verbs and adjectives. Speaking: Pair Activity (Explaining one's daily routine by using appropriate particles and verbs)

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Recognize and write Japanese alphabet	Understand
CO2: Comprehend the conversation and give correct meaning	Understand
CO3: Apply appropriate vocabulary needed for simple conversation in Japanese language	Apply
CO4: Apply appropriate grammar to write and speak in Japanese language	Apply
CO5: Speak using words of the Japanese language	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Genki 1 Textbook: An Integrated Course in Elementary Japanese by Eri Banno, Yoko Ikeda, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa, Kyoko Tokashiki published by The Japan Times

T2. Genki 1 Workbook: An Integrated Course in Elementary Japanese by Eri Banno published by The Japan Times

Reference Book(s):

R1. Japanese for Everyone: Elementary Main Textbook1-1, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007

R2. Japanese for Everyone: Elementary Main Textbook1-2, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007

Web References:

1. www.japaneselifestyle.com
2. www.learn-japanese.info/
3. www.learn.hiragana-katakana.com/typing-hiragana-characters/
4. www.kanjisite.com/

Course Code:23FLT202		Course Title: Foreign Language - German (Common to all B.E/B.Tech Programmes)	
Course Category: AEC		Course Level: Introductory	
L:T:P (Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max. Marks:100

Course Objectives:

The course is intended to:

1. Listen and understand numbers, names and dialogues of a native speaker on par with A1 level.
2. Speak and introduce self in simple sentences to convey their opinion and ideas on par with A1 level.
3. Read simple passages and given text on par with A1 level.
4. Write letter and simple sentences on par with A1 level.

UNIT I Basic Introduction to German Scripts 9 Hours

Theme and Text (Introduction to German - German script, Deutsche Namen, Daily Greetings and Expressions) – Grammar ('wh' questions, das Alphabet)– Speak Action (Buchstabieren, sich und andere vorstellen nach Namen und Herkunft fragen, internationale Wörter auf Deutsch verstehen, jemanden begrüßen)– pronunciation (Buchstabieren J,V,W,Y, - Long vowels A,E,I,O,U - Pronunciation of Ä,Ü,Ö) – To learn (internationale Wörter in Texten finden, Wörter sortieren)

Theme and Text (Gespräche im caf'e, Getränkekarte, Telefon-buch, Namen, Rechnungen) – Grammar (Frägesatze mit wie, woher, wo, was Verben in präsens Singular und Plural, das Verb Sein, Personalpronomen und Verben)– Speak Action (eine Gespräch beginnen sich und andere vorstellen zählen, etwas bestellen und bezhalen Telefonnummern und verstehen)– pronunciation (Wortakzent in Verben und in Zahlen) – To learn (Grammatiktabelle ergänzen, mit einem Redemittelkasten arbeiten)

UNIT II Numbers and Nominative Case 9 Hours

Theme and Text (Numbers – 1 to 12 (Eins bis Zwolf) – 20, 30, 40, 90 (zwanzig-Neunzig) – All Numbers (1-10000) – German Currency (Euro) – Basic Mathematics (plus, Minus, Malen, Geteilt durch)) – Grammar (Introduction of verbs –Have Verb – To Come, To Speak, To Read, To Drive, To Fly, To write, To Eat, To sleep, To take etc.,)

Theme and Text (Communication in course) – Grammar (Singular and Plural, Artikel: der,das,die/ ein,eine, verneinung: kein, keine, Komposita: das Kursbuch) – Speak Action

(Gegenständen fragen/ Gegenstände benennen im kurs:) – pronunciation (word accent Marking, Umlaute ö ä ü hören und sprechen) – To learn (Lernkarten schreiben, Memotipps, eine Regel selbst finden)

Theme and Text (City, Town, Language: Nachbar, Sprachen, Sehenswürdigkeiten in Europa) – Grammar (Past tense for Sein, W-Frage, Aussagesatz und Satzfrage) – Speak Action (about city and siteseeing) – pronunciation (Satzakzent in Frage- und Aussagesätzen) – To learn (eine Regel ergänzen, eine Grammatiktabelle erarbeiten, Notizen machen)

UNIT III Akkusative Case and Prepositions 9 Hours

Theme and Text (Menschen und Hauser, Furniture catalogue, E-Mail, House information) – Grammar (possesivartikel im Nominativ, Artikel im Akkusativ, Adjektive im satz, Graduierung mit zu)– Speak Action (Whonung bescreiben about perons and things)– pronunciation (consonant - ch) – To learn (wortschatz systematisch)

Theme and Text (Termine - Appointment and punctuality in Germany) – Grammar (questions with wann?, Preposition (am, um, von... bis), verneinung mit nicht, trennbare verben, präteritum von haben) – Speak Action (Daily plan making, time commitment, excuse for late coming) – pronunciation (consonants- p,b,t,d / k,g) – To learn (Rollenkarten arbeiten) Theme and Text (orientation in working area, go for work, floor plan city plan, office and computer) – Grammar (preposition: in,neben, unter, auf, vor, hinter, an, zwischen, bei und mit + Datic)– Speak Action (work place, work, giving appointments)– pronunciation (consonants: f,w und v) – To learn (Making notice in calender)

UNIT IV Dativ Case and Prepositions 9 Hours

Theme and Text (Holiday and Party, holiday plan, party plan in Germany) – Grammar (regular and iregular verbs) – Speak Action (holiday speak, accident, Ich-Text schreiben) – pronunciation (lange und kurze vokale markieren) – To learn (Text Order)

Theme and Text (organising an Excursion to Berlin through city orientation, Bus plan, City plan, post card, Excursion programme) – Grammar (preposition: in, durch, über + Akkusativ: zu, an... vorbei + Dativ, Modalverb wollen) – Speak Action (Tourism, culture, postcard preparation, travel description) – pronunciation (r and l)– To learn (plaket making)Theme and Text (Beruf und all Tag, Visiten karten, wörterbuch) – Grammar – Speak Action (profession, statistic speaking) – pronunciation (n,ng and nk)– To learn (wörterbuch , text information in tabel)

UNIT V Adjectives and Pronunciation 9 Hours

Theme and Text (Haushaltstipp, kochrezept, maße und gewichte, Mahlzeiten und Gerichte) – Grammar (jeden Tag, manchmal, nie, Question - welche, Comparison – viel, gut, gern) – Speak Action (about eat, drink question and answers) – pronunciation (e,en,el,er) – To learn (Text auswerten und zusammenfassen)

Theme and Text (Clothing , colour, weather) – Grammar (Adjecktive im Akkusativ, unbestimmer Artikel) – Speak Action (weather, dress and colour understanding) – pronunciation (e-o- ö and ie-u- ü) – To learn (wetter and Farben interkulturelle)

Theme and Text (in super market,purchase, House Maintainence, Emotion, Sports, Body parts) – Grammar (Modal Verb) – Speak Action (Body parts) – To learn (Rollenkarten arbeiten)

Total:45 Hours

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Recognize and write German alphabet, numbers.	Understand
CO2: Comprehend the conversation and give correct meaning	Understand
CO3: Apply appropriate grammar and vocabulary to write and speak.	Apply
CO4: Apply appropriate cases and texts to listen, write and speak.	Apply
CO5: Speak and read using words of the German language	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s)

T1. Netzwerk, “Deutsch als Fremdsprache” by Stefanie Dengler, Paul Rusch, Helen Schmitz published by Goyal Publishers & Distributors Pvt Ltd;

T2. Funk, Kuhn, Demme, “Studio D A1 Deutsch als Fremdsprache” published by Goyal Publishers & Distributors Pvt Ltd;

Reference Book(s)

R1. Hueber, “Fit for Goethe- Zertifikat A1 (Start Deutsch 1)” by Goyal Publishers and Distributors; 2016

Course Code: 23MAI203		Course Title: Calculus and Transforms (Common to AD, AM, CS, IT & SC)	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week) : 3: 0 :2	Credits: 4	Total Contact Hours: 75	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on differential calculus, vector calculus, ordinary differential equations, Fourier Series and Z transform to devise engineering solutions to solve real world problems.

Module I **23 Hours**

Differential Calculus: Curvature-Cartesian and Polar coordinates- radius of curvature-center of curvature- circle of curvature- Evolutes and Involutes.

Multivariable Calculus: Partial derivatives-total derivatives-Jacobian- maxima and minima and saddle points- Constrained maxima and minima: Method of Lagrange multipliers--Gradient- directional derivative- curl and divergence.

Ordinary Differential Equations of Second and Higher Orders: Second and higher order linear differential equations with constant coefficients — Second order linear differential equations with variable coefficients (Cauchy - Euler equation, Legendre's equation) – Method of variation of parameters — Solution of first order simultaneous linear ordinary differential
equations.

Module II **22 Hours**

Fourier Series: Dirichlet's condition -Fourier series — Even and odd functions- Half rangesine and cosine series - Parseval's identity -Harmonic Analysis.

Z Transforms: Z transform- region of convergence- properties of z transforms- inverse transform-Solution to homogeneous linear constant difference equations.

List of Experiments (Using suitable software): **30 Hours**

1. Find the radius of curvature of a given curve.
2. Find the extremum value of a given function.
3. Compute second order ordinary differential equation.
4. Find the Fourier series of a periodic function.
5. Compute solution of difference equation using z transform.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply differential calculus to find curvature of a curve, Jacobian, extremum of functions of several variables and vector quantities to solve problems in Science and Engineering.	Apply
CO2: Solve the second and higher order ordinary differential equations using various techniques.	Apply
CO3: Determine the Fourier series of periodic functions and solve finite difference equations using Z-transforms.	Apply
CO4: Develop programs using calculus and transforms concepts through modern tool.	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & sons, 2010.

T2. B.S.GrewaI, Higher Engineering Mathematics, 44th Edition, Khanna Publishers, 2015.

Reference Book(s):

R1. Veerarajan T., Engineering Mathematics for first year, 3rd edition, Tata McGraw-Hill,New Delhi, 2019.

R2. Srimanta Pal & Subodh C. Bhunia. “Engineering Mathematics”, 1st Edition, Oxford University Press, 2015.

R3. P. Sivaramakrishna Das , C. Vijayakumari , Engineering Mathematics, Pearson India, 2017.

Web References:

1. https://nptel.ac.in/courses/111104092
2. https://www.classcentral.com/course/differential-equations-engineers-13258

Course Code: 23ITT201		Course Title: Data Structures (Common to AD,AM CS,IT &SC)	
Course Category: Major		Course Level: Introductory	
L:T:P(Hours/Week)3: 0: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

The objective of the course is to impart knowledge of fundamental data structures and how they are implemented. Additionally, learn how to apply the right data structures for solving problems.

Module I **22 Hours**

Linked List: Introduction- Types of Data Structures- Abstract Data type

List ADT: Array Implementation of list - Linked List Implementation list – Doubly Linked List –Circularly Linked List-Applications: Radix sort.

Stack ADT: Stack Model **—** Array and Linked List Implementation of Stack - Applications:Balancing Symbols - Postfix Expressions- Infix to Postfix Conversion

Queue ADT: Queue Model — Array and Linked List Implementation of Queue-Double endedQueue- Applications of Queue

Trees: Implementation of Trees - Tree Traversals -Binary Trees: Implementation – Expression Trees – Binary Search Tree: Implementation

Module II **23 Hours**

AVL Trees: Implementation -Single Rotation – Double Rotation.

Binary Heap: Min Heap-Max Heap

Graphs: Definitions – Representation of Graphs – Graph Traversals: Breadth First Search – Depth First Search -Topological Sort

Shortest Path Algorithms: Unweighted Shortest Paths –Dijkstra's Algorithm – Critical Path

All Pairs Shortest Path: Floyds Algorithm

Minimum Spanning Tree: Prim's Algorithm – Krushkal's Algorithm.

Internal Sorting:-Insertion Short-Shell Sort-Merge Sort-Quick sort

External sorting: Simple Algorithm-Multiway Merge

Hashing: Hash Functions-Separate Chaining-Open Addressing-Rehashing-Extendible hashing

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Implement principles of Data Structures that efficiently managedynamic collections of data in real-world applications.	Apply
CO2: Categorize the linear data structures list, stack and queue to various applications	Analyze
CO3: Relate the nonlinear data structures trees and graph concepts to various applications	Analyze
CO4: Interpret various internal and external sorting techniques to solve real world problems across different domain	Apply
CO5 : Analyze different hash function properties for efficient data storage and retrieval systems	Analyze
CO6: Develop solutions with ethical standards as a team to the practical problems using Data Structures Concepts	Create

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-			-	-	-	-	-	-	-
CO5	-	-	-	-	2	-	-	-	-	-	-	-
CO6	-	-	3	2	-	-	-	2	2	2	2	2

High-3; Medium-2;Low-1

Text Book(s):

T1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education Asia, New Delhi, 2015.

Reference Book(s):

R1. Sahni Horowitz , “Fundamentals of Data Structures in C”, 2nd Edition Tata McGraw-Hill, New Delhi, 2008.

R2. Seymour “Lipschutz, Data Structures with C”, McGraw Hill, 2014.

R3. Thomas H Cormen, Charles E Leiserson, Ronald L Revest, Clifford Stein, “Introduction to Algorithms” 3rd ed., The MIT Press Cambridge, 2014

Web References:

1. https://www.coursera.org/specializations/data-structures-algorithms
2. https://archive.nptel.ac.in/courses/106/106/106106127/
3. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

Course Code: 23EEI201		Course Title: Digital System Design (Common to AD,AM,CS,IT and SC)	
Course Category: Multidisciplinary		Course Level: Introductory	
L:T:P(Hours/Week): 2: 0: 2	Credits:3	Total Contact Hours:60	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on basics of logic gates, number system and different types of implementations of digital circuits with its simplification methods. Also, course describes the analysis of synchronous and asynchronous sequential circuit. At the end of the course the basics in design of computer system is discussed.

Module I **15 Hours**

Number System Representation and Conversion - Logic Gates, Universal Gates - Boolean Algebra and Simplification Techniques: SOP — POS and Karnaugh Map Methods for Boolean Expression Simplification. Implementation of Combinational Logic - Arithmetic Circuits: Full Adder– Full Subtraction - Magnitude Comparator – Multiplexer – De-Multiplexer – Encoder and Decoder.

Module II **15 Hours**

Flip-Flop: RS - JK – T and D – Types of Triggering. Analysis of synchronous sequential circuit - Shift Register. Analysis of asynchronous sequential circuit – Hazards – Static, Dynamic and Essential Hazards Computer System — Computer Memory - Random Access Memory - Read Only Memory - Expanding Memory Capacity –Secondary Storage -Input / Output Devices.

List of Experiments **30 Hours**

1. Verification of Boolean theorems using digital logic gates
2. Implementation of combinational circuits using basic gates
3. Logic verification of half adder and full adder
4. Logic verification of Multiplexer / De-Multiplexer
5. Logic verification of 4 bit shift register
6. Logic verification of 3 bit binary counter

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Understand the numbers system representation, operation of logic gates and design of computer system	Understand
CO2: Apply the fundamental concepts of Boolean algebra insimplification of digital circuits	Apply
CO3: Design and implement the arithmetic circuits using combinational logiccircuits.	Create
CO4: Analyze the sequential logic circuit and infer the results.	Analyze
CO5: Analyze and interpret the digital circuits by performing hardware implementations and report the inference as a team or individual.	Evaluate

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. M. Morris Mano, “Digital Logic and Computer Design”, 1st Edition, Pearson Publication, New Delhi, 2016.

T2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, 6th Edition, McGraw-Hill, 2011.

Reference Book(s):

R1. Anil K. Maini, “Digital Electronics Principles, Devices and Applications”, John Wiley & Sons,1st Edition, 2007.

R2. Charles H.Roth, Jr. “Fundamentals of Logic Design”, 7th Edition, Jaico publishing House,New Delhi, 2014.

R3. S.Salivahanan and S. Arivazhagan, Digital Circuits and Design, Oxford UniversityPress, 5th Edition, 2018.

R4. Leach P Donald, Albert Paul Malvino and Goutam Saha, “Digital Principles and Applications”, 7th Edition, Mcgraw Hill, 2010.

Web References:

1. http://www.nptel.ac.in/courses/ 108105132
2. https://de-iitr.vlabs.ac.in
3. https://nptel.ac.in/courses/117105080

Course Code: 23MEL001	Course Title: Engineering Drawing (Common to AD,AM,CS,EA,EC,EE,EV,IT,SC)		
Course Category: Multidisciplinary		Course Level: Introductory	
L:T:P(Hours/Week) 1: 0: 3	Credits:2.5	Total Contact Hours: 60	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on basic dimensioning. 2D and 3 D drawings such as points, lines,planes and solids on first quadrant.

Module I **8 Hours**

Basics of Engineering Drawing: Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. Basic Geometrical constructions – Orthographic projection- Free hand Sketching.

Projection of Points, Lines: First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces by rotating object method.

Projection of Solids: Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination).

Module II **7 Hours**

Sectioned Solids: Sectioning of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by cutting planes inclined to one reference plane and perpendicular to the other **—** Orthographic views of sections of simple solids.

Development of Surfaces: Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders using straight line and radial line method.

Isometric Projection: Principles of isometric projection — Isometric scale –Isometric projections of simple solids and truncated solids. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination).

List of Experiments **45 Hours**

1. Lettering & Dimensioning
2. Projection of Points & Lines
3. Orthographic projections
4. Projection of Simple Solids
5. Projection of Section of Simple Solids
6. Development of Surfaces
7. Isometric Projections

Course Outcomes At the end of this course, students will be able to:	**Cognitive Level**
CO 1: Apply the concepts related to free hand sketching, orthographic and Isometricprojection in first quadrant.	Understand
CO2: Apply the concepts and draw projections of points in four different quadrants and lines located first quadrant.	Apply
CO3: Apply the concepts and draw projections and sections of simple solids using rotating object method.	Apply
CO4: Apply the concepts and draw lateral surface of simple solids using straight line and radial line development methods.	Apply
CO5: Apply the concepts and draw isometric view of simple solids and truncated solids using principles of isometric projection.	Apply
CO6: Conduct experiments to demonstrate concepts, implement and analyze the drawing concepts using engineering tool: Using AutoCAD.	Analyze

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-
CO6	-	3	-	-	3	-	-	-	1	1	-	1

High-3; Medium-2; Low-1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Textbook:

T1. Cencil Jensen, Jay D.Helsel and Dennis R. Short, " Engineering Drawing and Design", TataMcGraw Hill India, New Delhi, 3rd edition, 2019.

Reference Book(s):

R1.Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill India,New Delhi, 2nd edition, 2014.

R2. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw India, New Delhi, 3rd edition, 2010.

R3. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, Gujarat, 54rd edition, 2023.

Publications of Bureau of Indian Standards

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.IS9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
2. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.IS 11669 – 1986 &SP 46 – 2003: Dimensioning of Technical Drawings.
3. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods. The mode ofdelivery is like practical.

Web References:

1. http://nptel.ac.in/courses/112103019/
2. https://www.coursera.org/specializations/autodesk-cad-cam-cae-mechanical-engineering

Course Code: 23ITL201		Course Title: Data Structures Laboratory (Common to AD,AM,CS,IT & SC)	
Course Category: SEC		Course Level: Introductory	
L:T:P(Hours/Week) 0:0:3	Credits:1.5	Total Contact Hours:45	Max Marks:100

Course Objectives:

The objective of the course is to improve students' abilities to create and analyze basic linear and nonlinear data structures. It improves students' capacity to pick and use the ideal data

List of Experiments **45 Hours**

1. Array based implementation of List ADT
2. Array based implementation of Stack ADT and Queue ADT
3. Linked list implementation of List ADT
4. Linked list implementation of Stack ADT and Queue ADT
5. Implementation of Binary Tree traversals
6. Implementation of Binary Search Tree
7. Implementation of Graph traversals
8. Implementation of Floyds Algorithms
9. Implementation of insertion sort
10. Implementation of Quick sort

Course Outcomes	CognitiveLevel
At the end of this course, students will be able to:	
CO1: Implement linear data structure operations using C programs	Apply
CO2: Predict the solution using non-linear data structure data structuresusing C programs	Evaluate
CO3: Evaluate the efficiency of sorting algorithms using relevant data structures	Evaluate

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	2	-	-	-	-	-	-	-
CO2	-	2	-	3	3	-	-	-	-	-	-	-
CO3	-	-	2	3	3	-	-	-	-	-	-	-

High-3; Medium-2; Low-1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Reference Book(s):

R1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, PearsonEducation Asia, New Delhi, 2015.

R2. Sahni Horowitz , “Fundamentals of Data Structures in C”, 2nd Edition Tata McGraw-Hill,New Delhi, 2008.

Web References:

1. https://www.coursera.org/specializations/data-structures-algorithms
2. https://archive.nptel.ac.in/courses/106/106/106106127/
3. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

Course Code:23CSL201		Course Title: IT Practices Laboratory (Common to AD,AM,CS,IT&SC)	
Course Category: SEC		Course Level: Introductory	
L:T:P (Hours/Week) 0:0:4	Credits: 2	Total Contact Hours: 60	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on developing web and mobile applications.

List of Experiments: **60 Hours**

1. Study of Peripheral Devices and PC Hardware.
2. Study of different communication protocols
   - USB
   - HDMI
   - WIFI
   - Bluetooth
3. Develop a web page with image, text, links, tables, Menus, Navigations bars, containers and Media.
4. Construct a web page to display resume.
5. Construct a web page to display the products of a company.
6. Create an application using GUI widgets, Layouts, Media and Event handlers.
7. Develop a calculator application to perform all arithmetic operations.
8. Construct an application to calculate BMI.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Identify the components of PC hardware.	Understand
CO2: Design and develop websites, mobile applications for the given scenario using open source tools.	Apply
CO3: Optimize web application performance by considering factors such as page load times, resource usage, and caching mechanisms for ensuring efficient user experiences.	Apply
CO4: Demonstrate the developed web and mobile applications with an oralpresentation.	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Reference(s):

R1. Peter Abel, Niyaz Nizamuddin, “IBM PC Assembly Language and Programming”, Pearson Education, 2007.

R2. Harvey M. Deitel, Paul J. Deitel,“Internet and World Wide Web — How to Program”, 4th Edition, Pearson Education Asia, 2009.

R3. David Wolber, Hal Abelson, Ellen Spertus, Liz Looney, “App Inventor 2: Create Your Own Android Apps”, 2nd Edition, O'Reilly Media, 2014.

Web References:

1. Open Element Tool: https://www.openelement.uk/index.htm
2. MIT App Inventor Tutorials: https://appinventor.mit.edu/explore/ai2/tutorials

Course Code: 23ESL201		Course Title: Professional Skills 1:Problem solving skills & Logical Thinking 1 (Common to all B.E/B.Tech Programmes)	
Course Category: SEC		Course Level: Introductory	
L:T:P(Hours/Week)0:0:2	Credits: 1	Total Contact Hours: 30	Max Marks: 100

Course Objectives:

- To enhance the students' numerical, analytical and logical reasoning ability.
- To make them prepare for various public and private sector exams and placement drives.

Module I Quantitative Ability **20 Hours**

Number System and LCM & HCF- Percentage- Ratio and Proportion - Average- Progressions- Ages-Partnership- Mixture & Allegation - Profit and loss- Interest calculation- Data interpretation.

Module II Reasoning Ability **10 Hours**

Seating Arrangement- Linear, circular and Complex – Direction Problems- Blood Relation- Puzzles- Crypt arithmetic- Venn diagrams- Statement and conclusion- Statement and argument- Causes and effects- Self-Learning.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Build the competence in numerical, analytical and logical reasoning ability	Apply

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	-

High-3; Medium-2; Low-1

Text Book(s):

T1: Dr. R. S. Aggarwal. “Quantitative Aptitude for Competitive Examinations” Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018.

T2: Dr. R. S. Aggarwal. “A Modern Approach to Logical Reasoning”, Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018

Reference Book(s):

R1: R. V. Praveen. “Quantitative Aptitude and Reasoning” 2nd Revised Edition, Prentice-Hall of India Pvt.Ltd, 2013

R2: Arun Sharma. “Quantitative Aptitude for Common Aptitude Test”, McGraw Hill Publications, 5th Edition, 2020

R3: Arun Sharma. “Logical Reasoning for Common Aptitude Test”, McGraw Hill Publications, 6th Edition, 2021

Web References:

1. https://www.indiabix.com/aptitude/questions-and-answers/
2. https://www.geeksforgeeks.org/aptitude-questions-and-answers/

Course Code: 23VAT201	Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes)		
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

மாணவர்கள் இப்பாடத்தை கற்றலின் மூலம்

CO.1 நெசவு மற்றும் பானைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்ள இயலும்.

CO.2 அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்ள இயலும்.

தமிழரும் தொழில்நுட்பமும்

அலகு 1 – நெசவு மற்றும் பானைத் தொழில்நுட்பம் 3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்

அலகு 2 – வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் ஷ சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள், பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ – சாரோசெனிக் கட்டிடக் கலை.

அலகு 3 – உற்பத்தித் தொழில்நுட்பம் 3

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

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் 3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன் வளம் – முத்து மற்றும் முத்துக் குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு 5 – அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் 3

அறிவியல் தமிழின் வளர்ச்சி – கணினித் தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மென் பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக் கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

Course Outcomes	**Cognitive Level**
மாணவர்கள் இப்பாடத்தை கற்றபின்	
CO.1 நெசவு மற்றும் பானைத் தொழில்நுட்பம், வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம், உற்பத்தித் தொழில்நுட்பம், வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் ஆகியன குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)
CO.2 அறிவியல் தமிழ் மற்றும் கணினித் தமிழ் குறித்து அறிந்து கொள்வார்கள்.	அறிதல் (Understand)

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால 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 Civilization 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.

Course Code: 23VAT201		Course Title: TAMILS AND TECHNOLOGY (Common to all B.E/B.Tech Programmes)	
Course Category: VAC		Course Level: Introductory	
L:T:P (Hours/Week) 1: 0 :0	Credit: 1	Total Contact Hours: 15	Max Marks:100

Pre–requisites

- NIL

Course Objectives

The course is intended to:

1. Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.
2. Understand the Scientific Tamil & Tamil Computing.

TAMILS AND TECHNOLOGY

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)- Thirumalai Nayakar 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 Kumizhi Thoompu 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

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO.1 Understand Weaving and Ceramic Technology, Design and Construction Technology, Manufacturing Technology, Agriculture and Irrigation Technology.	Understand
CO.2 Understand the Scientific Tamil & Tamil Computing.	Understand

Course Articulation Matrix

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	1	-	-

High–3; Medium–2; Low–1

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

TEXT - CUM REFERENCE BOOKS

1 தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை
(வெளியீடு. தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)

2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)

3. கீழடி – வைகை நதிக்கரையில் சங்க கால 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 Civilization 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.

Course Code: 23CHT202	Course Title: Environmental Sciences (Common to all B.E/B.Tech Programmes)		
Course Category: Multidisciplinary		Course Level: Introductory	
L:T:P(Hours/Week)1: 0: 0	Mandatory Non-Credit Course	Total ContactHours: 15	Max Marks:100

Course Objectives:

The course is intended to impart knowledge on sustainable utilization of natural resources, prevention of pollution, disaster management and environmental issues & public awareness on ecosystem.

Module I **8 Hours**

Natural Resources

Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

Environmental Pollution and Disaster Management

Role of an individual in prevention of pollution; Disaster management: floods, earthquake, cyclone and landslides.

Environmental Ethics and Legislations

Environmental ethics : Environment Protection Act; Air Act; Water Act ; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation.

Module II **7 Hours**

Environmental Issues and Public Awareness

Public awareness - Environment and human health.

Environmental Activities

(a) Awareness Activities:

i. Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste.
ii. Slogan making event.
iii. Poster making event.

(b) Actual Activities:

i. Plantation.
ii. Cleanliness drive.
iii. Drive for segregation of waste.
iv. To know about the different varieties of plants.
v. Shutting down the fans and ACs of the campus for an hour or so.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Explain the use of natural resources for a sustainable life as an individual in prevention of pollution.	Understand
CO2: Apply the environmental ethics and legislations for various environmental issues.	Apply
CO3: Create the public awareness on environment and human health as an individual or team through various activity-based learning.	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	3	3	-	-	-	-
CO3	3	-	-	-	-	3	3	-	3	3	-	-

High-3; Medium-2;Low-1

Text Book(s):

T1. Benny Joseph, “Environmental Studies", Tata McGraw Hill, New Delhi, 2006.

T2. Mackenzie Davis and Susan Masten, “Principles of environmental engineering andscience”, Mc-Graw Hill, 3rd Edition, 2014.

Reference Book(s):

R1. Trivedi R.K. “Handbook of Environmental Laws, Rules, Guidelines, Compliancesand Standards", Vol.I and II, Enviro Media.

R2. Cunningham, W.P.Cooper, T.H. Gorhani, “Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.

Web References:

1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview.
2. https://en.wikipedia.org/wiki/Environmental_science.

Semester III

Course Code: 23MAT306		Course Title: Probability and Statistics for Data Science	
Course Category: Minor		Course Level : Introductory	
L : T : P (Hours/ Week) 3 : 1 : 0	Credits: 4	Total Contact Hours: 60	Max Marks:100

Course Objectives:

The aim of this course is to provide the student with an understanding of probability distributions and random variables. They gain knowledge regarding statistical quality control and hypothesis testing for data science.

Module I **22+8 Hours**

Probability and Random Variables

Axioms of Probability – Conditional Probability – Total Probability – Baye's Theorem – Random Variables – Probability Mass Function – Probability Density Functions – Properties – Moments – Moment generating functions and their properties – Binomial – Poisson – Properties, Moment generating function – Uniform – Exponential – Normal Distributions and their properties.

Two Dimensional Random Variables

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression using least square method – Transformation of random variables.

Test of Hypotheses – Large Sample Test

Sampling distributions, Estimation of parameters, Statistical hypothesis, Large sample test based on Normal distribution for single mean and difference of means, variance and proportion.

Module II **23+7 Hours**

Test of Hypotheses – Small Sample Test

Tests based on t, Chi-square and F distributions, Contingency table (test for independence), Goodness of fit.

Design of Experiments

Analysis of Variance (ANOVA) – One-way and Two-way Classification – Completely Randomized Design(CRD) – Randomized Block Design (RBD) – Latin square Design(LSD).

Statistical Quality Control

Control charts for measurements ($\bar{X}$ and R Charts) – Control charts for attributes (p, c and np charts – Tolerance limits – Acceptance sampling.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply standard distributions and the concepts of random variables, to solve real- world problems	Apply
CO2: Apply suitable test of significance for making decisions in hypothesis testing	Apply
CO3: Demonstrate, design, use measures to interpret control charts for attributes and variables	Apply
CO4: Outline the basic knowledge of probability and random variables, hypothesis testing, and control charts	Understand

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1 .Veerajan T, “Probability, Statistics and Random process”, 3rd Edition, Tata McGraw-Hill, New Delhi, 2017

T2 .Dr.J.Ravichandran, “Probability and Statistics for Engineers”, 1stEdition, Wiley India Pvt. Ltd., 2010

Reference Book(s):

R1 .R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, “Probability and Statistics for Engineers and Scientists”, 9th Edition Pearson Education, Asia, 2013

R2 .M.R. Spiegel, J. Schiller and R.A. Srinivasan, “Schaum's Outlines Probability and Statistics”, 4th Edition, Tata McGraw Hill Education, 2012

R3 .Morris DeGroot, Mark Schervish, “Probability and Statistics”, Pearson Educational Ltd, India. 4th Edition, 2014

Web References:

1. https://archive.nptel.ac.in/courses/111/105/111105090/

2.https://archive.nptel.ac.in/courses/111/105/111105041/

Course Code:23CST301		Course Title: Design and Analysis of Algorithms (Common to CS & AD)	
Course Category: Major		Course Level: Intermediate	
L: T: P(Hours/Week) 3: 1: 0	Credits: 4	Total Contact Hours: 60	Max Marks: 100

Course Objectives:
The objective of the course is to impart knowledge on fundamental strategies of algorithm design and how to analyze the efficiency of the algorithm.

Module I Algorithm Analysis and Simple Design Techniques 23 +7 Hours

Analysis of Algorithm Efficiency: Algorithm – Fundamentals of Algorithmic Problem Solving – Problem types - Algorithm Analysis Framework - Asymptotic Notations - Basic efficiency classes – Mathematical Analysis of non-recursive algorithms - Mathematical Analysis of recursive algorithms - Empirical Analysis of algorithms.
Brute force Technique: Exhaustive Search - String matching: naïve approach – Searching: Linear Search algorithm – Sorting: Bubble sort algorithm - Matrix multiplication - Closest pair problem.
Divide and Conquer Technique: String matching: KMP approach - Searching: Binary Search – Sorting: Quick sort algorithm – Strassens Matrix multiplication – Closest pair problem.

Module II Advanced Algorithm Design Techniques 22 + 8 Hours

Limitations of Algorithm Power: P, NP and NP Complete problems
Greedy Technique: Container Loading - Knapsack Problem - Job Sequencing with Deadlines - Huffman Tree.
Dynamic Programming Technique: Binomial Coefficient - Warshall's algorithm - Multistage Graph – String Edit Distance.
Backtracking Technique: n-Queens problem - Hamiltonian Circuit - Subset-sum problem - Graph colouring.
Branch and Bound Technique: Assignment problem - Knapsack problem - Travelling salesman problem.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Solve real world problems by using various algorithmic design techniques to find optimal solution	Apply
CO2: Estimate the complexity of algorithms using algorithmic analysis	Analyze
CO3: Compare and contrast the working of various design techniques and choose the suitable technique for problem solving	Evaluate
CO4: Involve in independent learning for finding solutions to real world applications by working individually or as a team.	Apply

Course Articulation Matrix:

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Anany Levitin, “Introduction to the Design & Analysis of Algorithms”, 3rd Edition Pearson Education, 2017

T2. Sartaj Sahni, “Data Structures, Algorithms, And Applications in Java”, 2nd Edition, Universities Press (India) Pvt. Limited, 2005

Reference Book(s):

R1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 4th Edition, MIT Press, 2022

R2. S.Sridhar, “Design and Analysis of Algorithms”, 2nd Edition, Oxford University Press, 2023

Web References:

1. NPTEL course on Design and analysis of algorithms - https://archive.nptel.ac.in/courses/106/106/106106131/
2. Coursera course on Analysis of Algorithms - https://www.coursera.org/learn/analysis-of-algorithms?action=enroll
3. Udemy course on Introduction to Algorithmic Design and Analysis - Learn The Art of Computer Programming - https://www.udemy.com/course/introduction-to-algorithmic-design-and-analysis/

Course Code: 23CST302		Course Title: Computer Architecture (Common to CS & AD)	
Course Category: Minor		Course Level: Intermediate	
L:T:P(Hours/Week) 3: 0: 0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on memory organization, addressing modes of a processor, the organization of cache memory and pipelining techniques for the design of high speed processor.

Module I Processor Architecture **22 Hours**

Basic Structure of Computers:

Evolution of Microprocessor - Basic Processor Architecture - Operational concepts – Performance.

Instruction Set Architecture:

Memory location - Memory Operations – Instructions and sequencing - Addressing modes - CISC Vs RISC.

Basic Input/Output, Processing Unit :

Accessing I/O devices - Interrupts -Buses - Instruction Execution-DMA–Hardware Components – Instruction Fetch and Execution Steps – Control Signals-Hardwired Control - CISC Style Processors: Interconnect using Buses, Micro programmed Control.

Module II Cache Design and Pipelining **23 Hours**

The Memory System: Characteristics of Memory Systems - Cache Memory Principles - Elements of Cache Design - Mapping Function - Example of Mapping Techniques - Replacement Algorithms - Performance Consideration.

Pipelining : Basic concept - Pipeline Organization and issues - Data Dependencies – Memory Delays – Branch Delays – Resource Limitations - Performance Evaluation - Superscalar operation –Pipelining in CISC Processors - Instruction Level Parallelism – Parallel Processing Challenges – Flynn’s Classification – Hardware multithreading – Multicore Processors: GPU, Multiprocessor Network Topologies.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Compare different instruction set architectures and identify their implications on system performance.	Evaluate
CO 2: Analyze various design elements to determine suitable memory organization for optimized performance.	Analyze
CO 3: Apply principles of pipelining and instruction-level parallelism to enhance processor performance.	Apply
CO 4: Engage in independent learning to deliver an oral presentation on emerging computer architectures and their applications.	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Carl Hamacher, Zvonok Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, 6th Edition, McGraw Hill, 2012

T2. David A. Patterson and John L. Hennessey, “Computer Organization and Design: The Hardware/Software Interface”, 5th Edition, Morgan Kauffman / Elsevier, 2014

Reference Book(s):

R1. William Stallings, “Computer Organization and Architecture: Designing for Performance”, 10th Edition, Pearson Education, 2016

R2. John L. Hennessey and David A. Patterson, “Computer Architecture: A Quantitative Approach”, Morgan Kauffman / Elsevier, 5th edition, 2012

Web References:

1. Computer Architecture –Coursera: https://www.coursera.org/lecture/comparch/course-introduction-Ouq7L
2. Computer System Architecture-MIT Open Courseware Notes : https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-823-computer-system-architecture-fall-2005/index.html
3. Computer Architecture: NPTEL Course: http://www.nptel.ac.in/courses/106102062/

Course Code: 23CSI301		Course Title: Database Systems (Common to CS & AD)	
Course Category: Major		Course Level: Intermediate	
L:T:P(Hours/Week) 3:0:2	Credits:4	Total Contact Hours: 75	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge in database fundamentals, develop skills in designing databases and apply SQL for database manipulation.

Module I **22 Hours**

Foundations of DBMS: File System versus Database approach – Database applications – View of Data – Database Languages (DDL, DCL, DML, TCL) – Database Design – Data storage and querying – Architecture –Database Users and Administrators.

Relational Model: Terminology – Structure of Relational Database – Keys – Integrity Constraints – Schema Diagrams – Relational operations.

ER Modeling: Design Process – Entity Types – Relationship Types – Attributes – Structural Constraints – Reduction to Relational Schemas – Design Issues.

SQL Data Manipulation: Overview of Query Language – Data Types – Data Definition – SQL Queries – Aggregate functions – Nested Queries – Joins – Views – Integrity Constraints – Authorization.

Advanced SQL: SQL Programming Language – Functions and procedures – Cursors – Triggers – Accessing SQL from a Programming Language – SQL vs NoSQL.

Module II **23 Hours**

Normalization: Purpose – Data Redundancy and Update Anomalies – Functional Dependencies – Normalization Process – 1NF, 2NF, 3NF, BCNF.

Data Storage: Storage Media – RAID – Database Buffer – Indexing and Hashing.

Query Processing: Query Decomposition – Cost Estimation – Query Optimization.

Transaction and Concurrency Control: Transaction properties – Locking methods – Deadlock – Timestamp Methods – Validation Protocols – Consistency – Granularity.

Recovery System: Failure Classification – Recovery facilities – Recovery Techniques.

Introduction to Advanced Database concepts: Document database – Graph QL – Database Optimization.

List of Experiments **30 Hours**

1. Design databases using ER modeling
2. Create and modify database tables using DDL commands and manipulate table data using DML commands
3. Implement Joins and nesting concept for complex queries
4. Implement Functions and procedures using advanced SQL
5. Create Cursors and Triggers using SQL programming
6. Access database through JDBC connectivity

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Design ER models using various constructs to simulate the real world databases	Apply
CO2: Formulate structured and optimized queries to manipulate databases	Apply
CO3: Investigate the dependencies in a database and normalize to appropriate level	Analyze
CO4: Compare and contrast the various locking facilities to perform concurrent transactions on databases	Evaluate
CO5: Analyze the various database functionalities as an individual or team for real world applications.	Analyze

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. A Silberschatz, H Korth, S Sudarshan, “Database System Concepts”, 7th Edition, McGraw- Hill, 2019.

T2. Thomas Connolly, Carolyn Begg, “Database Systems: A Practical Approach to Design,Implementation and Management”, 6th Edition, Pearson Education, 2015.

Reference Book(s):

R1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, 7th Edition, Pearson Education,2017.

R2. C.J. Date, A. Kannan and S. Swamynathan– “An Introduction to “Database Systems”, 8th Edition, Pearson Education, 2006.

Web References:

1. Introduction to Database Systems: http://www.inf.unibz.it/~nutt/IDBs1011/idbs-slides.html
2. NPTEL lecture videos and notes: https://onlinecourses.nptel.ac.in/noc23_cs79/
3. SQL practice exercises with solutions: https://www.w3resource.com/sql-exercises/

Course Code: 23ADL301		Course Title: Internet Programming Tools Laboratory	
Course Category: Major		Course Level: Practice	
L:T:P (Hours/Week) 1: 0: 3	Credits:2.5	Total Contact Hours:60	Max Marks:100

Pre– requisites:

- IT Practices Laboratory

Course Objectives:

The objective of the course is to impart knowledge in common tools and techniques for developing Web-based applications, both client-side and server-side.

Module I **7 Hours**

HTML5 – HTML Tags, Structure, HTML Coding Conventions - Lists- Tables – Form Input Types – Lists-Header and Footer Elements.

CSS3 – CSS Overview - CSS Rules, CSS Syntax and Style - Class Selectors-ID Selectors-Span and div Elements- Cascading, style Attribute, style Container, External CSS Files - CSS Properties.

Module II **8 Hours**

JavaScript –Control Statements – Selection Statements – Repetition Statements – Functions – Events – Arrays – Objects – XML – Schema – DTD – XSLT.

PHP-Basics, String Processing and Regular Expressions, Form Processing and Business Logic-Using Cookies, Dynamic Content, PHP Files-PHP Database Connection.

List of Exercises **45 Hours**

1. Create a webpage using HTML5 Elements
2. Create a webpage to embed a map in Web page
3. Create a webpage using CSS3
4. Create a webpage to fix hot Spots in image using HTML5 and CSS3
5. Develop a webpage using the features of JavaScript
6. Develop a web form application using JavaScript and validate it
7. Validate the registration, user login, user profile and payment by credit card pages using JavaScript
8. Convert a XML page into HTML page using XSLT
9. Create a web application by using PHP
10. Develop a PHP Application that allows users to insert and update records into a MYSQl database using Webform

Suggested Areas for Web Application:

1)Passport Automation System
2)Book Bank
3)Exam Registration
4)Stock Maintenance System
5)Online Course Reservation System
6)E– ticketing
7)E– book Management System
8)Recruitment System
9)Library Management System
10)Student Information System
11)Credit Card Processing

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO 1: Build a static web page using Client Side scripting Languages	Apply
CO 2: Develop a real time webpage using Server Side scripting Languages	Create

Course Articulation Matrix

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

High– 3; Medium– 2;Low– 1

Text Book(s):

T1**.** Harvey Deitel, Paul Deitel, Abbey Deitel "Internet and World Wide Web How ToProgram", 5th Edition, Pearson Education Asia, 2020

T2. Uttam K.Roy, “Web Technologies”, Oxford University Press, 1st Edition,2012

Reference Book(s):

R1. Harvey Deitel, Paul Deitel, Abbey Deitel "Internet and World Wide Web How ToProgram", 5th Edition, Pearson Education Asia, 2019

R2. DT Editorial Services, "HTML 5 Black Book, Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery", 2nd Edition, Wiley, 2018

R3. Robin Nixon, "Learning PhP, MySQL & JavaScript with jQuery, CSS & HTML5",5th Edition, O'Reilly, 2018

Web References:

1. NPTEL Resources:https://onlinecourses.swayam2.ac.in/aic20_sp11/preview.
2. Coursera Resources:https://www.coursera.org/learn/introduction-to-web-development-with-html-css-javacript.
3. Udemy Courses: - https://www.udemy.com/course/html-css-certification-course-for-beginners-e/?couponCode=IND21PM.

Course Code: 23ADL302	Course Title: Problem Solving using Java Programming Laboratory		
Course Category: Major		Course Level: Introductory	
L: T: P(Hours/Week) 1: 0: 3	Credits:2.5	Total Contact Hours:60	Max. Marks:100

Pre-requisites:

- Problem Solving using C

Course Objectives:

The objective of the course is to impart knowledge of Object Oriented Programming Concepts interrelated with Java Programming.

Module 1 – Java with OOP Concepts **8 Hours**

OOP Concepts: Object Oriented Programming Concepts in Java.

Java Essentials: Data Types –Variables – Constants – Operators – Java Virtual Machine, Garbage Collection.

Java Classes and Methods: Classes & Methods – Constructors – Constructors overloading, Method Overloading – Static Members, Arrays – String Class.

Inheritance: Class Inheritance: Types – Method Overriding – Super Keyword – Final Variables and Methods – Final Classes – Abstract Classes and Methods.

Interfaces and Packages: Interfaces – Packages –Create & Importing Packages.

Module 2 – Java Exceptions, Threads, Collections and Built in Classes **7 Hours**

Exception: Types – Try – Catch – Multiple Catch – Nested Try – Throw – Throws – Finally.

Built in Exceptions – User Defined Exceptions.

Thread: Extending the Thread Class – Thread Life Cycle –Multithreading.

Utility Classes: Java Strings, String Buffer – String Tokenizer - Math.

Collection Interfaces: Set, List, Queue.

Collections Classes: ArrayList, LinkedList, HashSet - Accessing a Collection via an Iterator – Map interfaces.

List of Exercises **45 Hours**

1. Implement Java Programs using user inputs and control structures
2. Implement Java programs using Arrays and Iterators
3. Implement Java Programs using Classes, Objects with suitable Modifiers
4. Implement Java programs using constructors and static members
5. Implement Java programs using Inheritance, and Method overriding
6. Implement Java programs using Interfaces and Packages
7. Implement Java programs for different String Operations
8. Implement Java programs using Abstract class and Interfaces
9. Implement Java programs using Exception Handling and Thread
10. Implement Java programs using Different Java Collection Framework structures

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Develop the logical building programs using java for solving real time problems	Apply
CO2: Analyze the principles of java OOP concepts and packages for achieving the code reusability	Analyze
CO3: Apply to solve the business problems with the knowledge of error handling techniques and multi parallel tasking concepts	Apply
CO4: Develop the various data manipulation operations using different java frameworks for efficient programming	Apply

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Schildt. Herbert. “Java - The complete Reference”, 11th Edition, McGraw Hill Education, 2019.

Reference Book(s):

R1. Deitel and Deitel, “Java How to Program”, Prentice Hall, 11th Edition, 2017.

R2. Allen B. Downey, Chris Mayfield, “Think Java: How to Think Like a Computer Scientist”, O'Reilly, 2016.

Web References:

1. Programming In Java, “ https://onlinecourses.nptel.ac.in/noc19_cs84/preview”
2. Java Tutorial, “https://www.w3schools.com/java/”

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Course Code: 23ESL301		Course Title: Professional Skills 2: Problem solving skills & Logical Thinking 2 (Common to all B.E/B.Tech Programmes)	
Course Category: SEC		Course Level: Introductory	
L:T:P(Hours/Week) 0: 0: 2	Credits: 1	Total Contact Hours:30	Max Marks:100

Course Objectives:

The course is intended to enhance the students' numerical, analytical and logical reasoning ability. Also course focus to make learners prepare for various public and private sector exams and placement drives.

Module I **20 Hours**

Quantitative Ability

Time and work –Pipes and cisterns- - Time Speed Distance-Problems on Trains-Boats and Streams- Permutation and Combination-Probability, Menstruation- Heights and distance- Logarithms- Clocks and Calendars – Data Sufficiency.

Module II **10 Hours**

Reasoning Ability

Number & Alpha series- Odd man out-Coding and Decoding-Syllogisms- -Problems on Cubes and Dices- Logical Venn diagram -Visual Reasoning- Element & logical series- Analogies.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Enhance their problem solving skills & Logical thinking Skills	Apply

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	-

High-3; Medium-2; Low-1

Textbook(s):

T1. Dr. R. S. Aggarwal. "Quantitative Aptitude for Competitive Examinations" Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018

T2. Dr. R. S. Aggarwal. "A Modern Approach to Logical Reasoning", Sultan Chand & Sons Pvt. Ltd, New Delhi, 2018

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Reference Book(s):

R1. R. V. Praveen. “Quantitative Aptitude and Reasoning” 2nd Revised Edition, Prentice-Hall of India Pvt.Ltd, 2013
R2. Arun Sharma. “Quantitative Aptitude for Common Aptitude Test”, McGraw Hill Publications, 5th Edition, 2020
R3. Arun Sharma. “Logical Reasoning for Common Aptitude Test”, McGraw Hill Publications, 6th Edition, 2021

Web References:

1. https://www.indiabix.com/aptitude/questions-and-answers/
2 . https://www.geeksforgeeks.org/aptitude-questions-and-answers/

Course Code: 23VAT301		Course Title: Universal Human Values 2: Understanding Harmony (Common to all B.E/B.Tech Programmes)	
Course Category: VAC		Course Level: Practice	
L:T:P (Hours/Week) 2: 1: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Pre-requisites:

- Induction Program (UHV 1)

Course Objectives:

The course is intended to:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Strengthening of self-reflection
3. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
4. Development of commitment and courage to act
5. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

Unit I Introduction to Value Education **9 Hours**

Need for the Value Education; Self -exploration as the process for value education; Continuous Happiness and Prosperity: A look at basic Human Aspirations; Right understanding: Relationship and Physical Facilities; Happiness and Prosperity: current scenario; Method to fulfill the Basic human aspirations.

Unit II Harmony in Human Being **9 Hours**

Human being as a co-existence of self (‘I’) and the material ‘Body’; needs of Self ('I') and 'Body'; The Body as an instrument of ‘I’; Harmony in the self (‘I’); Harmony of the self (‘I’) with body; Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

Unit III Harmony in the Family and Society **9 Hours**

Harmony in the Family the basic unit of human interaction; Values in human to human relationship; Trust as the foundational values of relationship; Respect as the right evaluation ;Understanding harmony in the society (society being an extension of family); Vision for the universal human order.

Unit IV Harmony in the Nature **9 Hours**

Understanding the harmony in the Nature Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature; Existence as Co-existence at all levels; Holistic perception of harmony in existence.

Unit V Harmony on Professional Ethics 9 Hours

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics; Case study: holistic technologies, management models and production systems; Strategy for transition towards value-based life and profession.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Reflect on values, aspiration, relationships and hence identify strengths and weaknesses	Responding
CO2: Appraise physical, mental and social wellbeing of self and practice techniques to promote wellbeing	Responding
CO3: Value human relationships in family and society and maintain harmonious relationships	Valuing
CO4: Respect nature and its existence for survival and sustainable of all life forms and hence practice conservation of nature	Valuing
CO5: Appreciate ethical behavior as a result of value system in personal and professional situations	Receiving

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Book(s):

R1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999

R2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004

R3. The story of stuff, Annie Leonard, Free Press, New York 2010

Web References:

1. https://aktu.ac.in/hvpe/ResourceVideo.aspx
2. http://hvpenotes.blogspot.com/
3. https://nptel.ac.in/courses/109/104/109104068/

Semester IV

Passed in 5th Board of Studies Meeting held on 28.12.2023
Approved in 18th Academic Council Meeting held on 23.03.2024 BOS Chairman

Course Code: 23MAT403		Course Title: Discrete Mathematics for Artificial Intelligence	
Course Category: Minor		Course Level: Introductory	
L:T:P(Hours/Week) 3: 1: 0	Credits: 4	Total Contact Hours:60	Max Marks: 100

Course Objectives:

The objective of the course is aimed to equip engineering students with the mathematical tools and reasoning skills needed for effective problem-solving and analytical thinking in their respective fields.

Module I **22+8 Hours**

Logic: Propositions- Logical operators – Logical equivalences and implications - Normal forms –Rules of inference-Consistency and inconsistency- Theory of Inference – Proofs – Predicates – Quantifiers- Universe of discourse – Validity of arguments.

Relations and Functions: Relations –Types of relations – Properties of relations - Equivalence relations –Relational matrix - Graph of relations – Partial ordering relation - Poset – Hasse Diagram. Functions - Type of functions: Injective, surjective and bijective functions –Composition of functions – Inverse functions.

Combinatorics: Mathematical induction- Basics of counting–Pigeonhole principle – Permutations with and without repetition – Circular permutation – Combinations.

Module II **23+7 Hours**

Recurrence relations : Recurrence relations-Solution of linear recurrence relations.

Algebraic Structures: Algebraic Systems – properties – Semi groups and monoids – Groups - Sub groups- Homomorphism – Abelian group – Cyclic group – Normal subgroup and Cosets – Lagrange's theorem – Codes and Group codes.

Graph Theory:

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths- Spanning Tree Algorithms - Prim's Algorithm - Dijkstra's algorithm.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Apply propositional and predicate logic to solve engineering problems and implementing the concepts of sets, relations and functions in discrete structures	Apply
CO2: Solve problems using combinatorial techniques, such as counting principles, permutations and combinations in the context of algorithm design and analysis	Apply
CO3: : Apply the concepts of groups and its properties to algebraic structures and apply the concepts of graph theory in solving computing problems	Apply
CO4: Demonstrate a deepened understanding of fundamental concepts such as sets, relations, functions and combinatorics covered in lectures through guided practice and in tutorial exercises	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1.J.P.Trembly, R. Manohar, Discrete Mathematical Structures with applications to Computer Science, 1st Edition, TMH International Edition, July 2017

T2.T.Veerarajan, “Discrete Mathematical Structures with Graph Theory and Combinatorics”,1st Edition, Tata McGraw-Hill Education Private Limited, New Delhi, July 2017

Reference Book(s):

R1.Kennth H. Rosen, “Discrete Mathematics and Its Applications”, Seventh edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, July 2017

R2.Ralph P Grimaldi, Ramana. B. V, “Discrete and Combinatorial Mathematics”, 5th Edition, Pearson Education India, 2011

Web References:

1. http://nptel.ac.in/courses/106106094
2. https://nptel.ac.in/courses/111/104/111104026

Course Code: 23ADT401		Course Title: Artificial Intelligence –I	
Course Category: Major		Course Level: Introductory	
L:T:P(Hours/Week) 3: 0: 0	Credits:3	Total Contact Hours:45	Max Marks:100

Course Objectives:

The objective of the course is intended to solve the real world problems involving statistical and computational principles.

Module I **22 Hours**

Introduction to Artificial Intelligence

Introduction :Definitions - Foundations - History – State of Art – Intelligent Agents: Agents and Environments — The concept of Rationality - Nature of Environments - Structure of Agents - Problem Solving agents-Example problems.

Solving Problems by Searching

Searching for Solutions – Uninformed Search Strategies : Breadth First, Uniform Cost, Depth First, Depth Limited &Iterative Deepening, Bidirectional Search — Comparison of Uninformed Search Strategies - Informed Search strategies : Greedy BFS, A* search — Search contour - Memory Bounded Search — Heuristic Functions.

Search in Complex Environments

Local search algorithms and Optimization Problems – Local Search in Continuous Spaces – Search with Nondeterministic Actions-Online search agents and Unknown Environments.

Module II **23 Hours**

Adversarial search and Gaming

Game Theory — Optimal decision in games - Alpha —Beta Pruning- Monte Carlo Tree Search- Constraint Satisfaction Problem: Define CSP – Inference in CSPs - Backtracking search for CSP.

Knowledge and Reasoning

Logical Agents — Knowledge Based Agents –Logic: Propositional Logic – Theorem Proving- First Order Logic (FOL): Syntax and Semantics of FOL - Using FOL - Knowledge Engineering in FOL - Inference in FOL - Unification - Forward and Backward chaining — Resolution.

Automated Planning

Definition for Classical Planning-Algorithm for Classical Planning-Heuristics for Planning -Planning and acting in Non-deterministic domains - Hierarchical planning- Time, Schedule and Resources –Analysis of Planning approaches.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Identify the types and behavior of problem solving agents	Apply
CO2: Make use of the efficiency of various searching techniques in solving a problem	Apply
CO3: Apply real time searching technique to solve the given problem	Apply
CO4: Analyze the inference rules to the given knowledge base for theorem proving	Analyze
CO5: Choose the appropriate planning technique to solve the given problem	Evaluate

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1.Stuart J. Russell, Peter Norvig, “Artificial Intelligence – A modern Approach”, 4th Edition, Pearson Education Inc., 2022

Reference Book(s):

R1. Saroj Kaushik, “Artificial Intelligence”, Cengage Learning, 2019

R2. Lavika Goel, “Artificial Intelligence – Concepts and Applications”, Wiley, 2021

Web References:

1.Tool**:**SWI-Prolog

https://www.swi-prolog.org/download

https://www.swi-prolog.org/pldoc/man?section=quickstart

2.AIMA(Artificial Intelligence: A Modern Approach)

https://aima.cs.berkeley.edu/3rd-ed/ -Textbook followed

https://aima.cs.berkeley.edu/code.html-online code repository C++,Java, Python, LISP

3.Learn and Explore the concepts in AI-AI space tool developed at Laboratory of Computational Intelligence at University of British Columbia
https://aispace.org/index.shtml

Course Code: 23ADT402		Course Title: Foundations of Data Science	
Course Category: Major		Course Level: Practice	
L:T:P(Hours/Week): 3:0:0	Credits: 3	Total Contact Hours: 45	Max.Marks:100

Course Objectives:

The course is intended to impart knowledge on basics of data science and data mining.

Module I **22 Hours**

Data Mining: Introduction to Data Mining: Kinds of Data – Kinds of Patterns-Technologies-Basic Statistical Descriptions of data-Data Preprocessing: Data Quality – Major Tasks in Data Preprocessing .

Data Warehousing: Data Warehouse basic concepts -Data Warehouse Modeling - Data Cube and OLAP - Data Warehouse Implementation.

Association: Basic Concepts and Methods: Frequent Item set Mining Methods-Apriori algorithm.

Classification: Basic Concepts - Decision Tree Induction – Bayes Classification Methods –Rule Based Classification – K-Nearest-Neighbor Classifier.

Clustering: Cluster Analysis - Partitioning Methods - Hierarchical Methods - Density-Based Methods - Grid-Based Methods.

Module II **23 Hours**

Data Science: Benefits and uses-facets of data-Retrieving data-Data preparation-Exploratory data analysis.

Descriptive analytics: Frequency distributions-Outliers-IQR-Normal distributions-correlation-regression.

Data wrangling: Basics of numpy arrays-aggregations-Data manipulation with Pandas-pivot tables.

Predictive analytics: Linear least squares-implementation-goodness of fit-testing a linear model-multiple regression-logistic regression.

Data visualization: importing Matplotlib-Line plots-Scatter plots-Histograms.

Course Outcomes	Cognitive level
At the end of this course, students will be able to:	
CO1: Distinguish the types of data and applications of data warehousing	Apply
CO2: Categorize the kinds of patterns that are discovered by association rule mining	Analyze
CO3: Classify the dataset items using algorithms and clustering based on models	Apply
CO4: Utilize the tools and techniques to identify the trends and patterns in data	Apply
CO5: Examine data visualization and wrangling the data to forecast future outcomes using predictive analytics	Analyze

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining: Concepts and Techniques”, 3rd Edition, Elsevier, 2012.

T2. David Clenlen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publicationa, 2016

T3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016

T4. Robert S. Witte and John S. Witte, “Statistics”,11th Edition, Wiley Publictions,2017

Reference Book(s):

R1. Jure Leskovec, Anand Rajaraman, Jeffery David Ullman, “Mining of Massive Datasets”, 2nd Edition, Cambridge University Press, 2014

R2. Ian H.Witten, Eibe Frank, Mark A.Hall, “Data Mining: Practical Machine Learning Tools and Techniques”, 3rd Edition, Elsevier, 2011

R3. EMC Education Services, “Data Science and Big Data Analytics Discovering, Analyzing, Visualizing and Presenting Data”, Wiley, 2015

Web References:

Data Mining:

1. https://www.geeksforgeeks.org/data-mining
2. https://onlinecourses.nptel.ac.in/noc21_cs06/preview

Data Science:

1. https://www.simplilearn.com/tutorials/data-science-tutorial/

Numpy and Data visualization:

1. https://onlinecourses.nptel.ac.in/noc22_cs32/preview

Course Code: 23ADT403		Course Title: Operating System Principles	
Course Category: Major		Course Level: Practice	
L:T:P(Hours/Week) 3: 0: 0	Credits: 3	Total Contact Hours: 45	Max Marks: 100

Course Objectives:

The course is intended to impart knowledge on components of operating systems and its services using Scheduling algorithms for process and memory management and techniques used for free space management in various administrative tasks of Linux environment for Managing Memory in Cloud and also used for aerospace and defense systems.

Module I Introduction to Process and Memory Management 22 Hours

Operating System Concepts: Computer System Organization Operating System Operations Kernel Data Structures - Operating Systems Structures: System Components, Operating System Services, System calls - System Programs Process Concepts: Process Scheduling, Operation on Process, CoOperating process, Inter Process Communication.

Process Management: CPU scheduling: Scheduling Algorithms Process Synchronization: The Critical Section Problem, Peterson's Solution, Hardware Support for Synchronization, Mutex Locks, Semaphores, Monitors Classical problems of Synchronization Deadlock: Deadlock Characterization Methods for handling Deadlocks: Deadlock Prevention, Avoidance, Detection and Recovery from Deadlock.

Memory Management: Main Memory: Contiguous Memory Allocation, Paging, Structure of Page Table, Swapping Virtual Memory: Demand paging, Copy-on-write, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Module II File Systems and Linux Programming 23 Hours

File Systems: Mass Storage System: Disk Structure, Disk Attachment, Disk Scheduling File System Interface: File Concepts, Access methods, Directory Structure, File Protection File System Implementation: File System Structure and Operations, Directory Implementation, Allocation methods, Free Space Management.

Linux: Design Principles Kernel Modules Process Management Scheduling Memory Management File Systems Input and Output Inter-process Communication Network Structure Security.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Solve process scheduling and synchronization problems using algorithms	Apply
CO2: Compare different memory management techniques using allocation schemes	Apply
CO3: Develop solutions for free space management using file systems and disk scheduling concepts	Apply
CO4: Make use of various administrative tasks in Linux environment using its components and services	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1. Abraham Silberschatz , Galvin.P.B.and Gagne, “Operating System Concepts”,10th Edition, John Wiley & Sons, 2018

Reference Book(s):

R1. Andrew S. Tanenbaum, "Modern Operating Systems", 4th Edition, Pearson Education, 2015

R2. William Stallings, "Operating Systems Internals and Design Principles”, 9th Edition, Pearson Education, 2018

Web References:

1. MIT open course on Operating System Engineering: http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-828-operating-system-engineering-fall-2012/

2. Bell's Course Notes on Operating Systems Processes:

https://www2.cs.uic.edu/~jbell/CourseNotes/OperatingSystems/3_Processes.html

3. NPTEL course on Operating System Fundamentals:

https://nptel.ac.in/courses/106/105/106105214/

Course Code: 23ADI401		Course Title: Data Communication and Networks	
Course Category: Major		Course Level: Practice	
L:T:P(Hours/Week) 3: 0: 2	Credits: 4	Total Contact Hours: 75	Max Marks:100

Course Objectives:

The course focuses on fundamentals of networking concepts, aims to equip participants with the necessary skills and knowledge to analyze the working functionalities of different layers in TCP/IP.

Module I **22 Hours**

Computer Network Introduction: Data Communications - Networks - Network Types - Standards and Administration.

Link Layer: ARP – RARP - Block Coding - Hamming Distance - Cyclic Redundancy Check – Checksum - DLC Services - Stop and Wait Protocol - Go Back N ARQ - Selective Repeat ARQ.

Network Layer I: Packetizing - Routing and Forwarding – Packet Switching - Network-Layer Performance.

Module II **23 Hours**

Network Layer II: IPv4: Classful and Classless Addressing – IPv4 Datagram – Options - ICMPv4 - Mobile IP - IPv6 Addressing - IPv6 Protocol - Routing Information Protocol - Open Shortest Path First Algorithm

Transport Layer: Transport Layer Services - UDP - TCP Segment – TCP Connection Establishment and Termination – TCP Congestion Control

Application Layer: HTTP - FTP - Electronic Mail - TELNET - SSH - Domain Name Space

List of Experiments **30 Hours**

(Exercises are to be carried out using Java / Python / Wireshark / Command Line Utility / GNS3)

1. Network trouble shooting and performance monitoring using ipconfig, ping, netstat and tracert commands.
2. Interpret the working principles of address resolution protocol.
3. Examine IP traffic and its routing options.
4. Analyze the TCP connection establishment and termination.
5. Configure LAN for generation of data traffic.
6. Implementation of and client server communication using socket programming.

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO 1: Analyze the working principles of TCP/IP model and addressing to effectively manage data communication in networking.	Analyze
CO 2: Examine the protocol functionalities of the network, transport and application layer in TCP/IP model.	Analyze

Course Articulation Matrix

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

High-3; Medium-2; Low-1

Text Book(s):

T1. Behrouz A. Forouzan, “Data communication and Networking”, 6th Edition, Tata McGraw-Hill Publishing Co. Pvt., Ltd., New Delhi 2022.

Reference Book(s):

R1. Larry L. Peterson and Bruce S. Davie, “Computer Networks – A Systems Approach”, 6th Edition, Morgan Kaufmann Publishers, 2019

R2. William Stallings, “Data and Computer Communication”, 10th Edition, Pearson Education, New Delhi 2013

Web References:

1. Networking Practice exercises:

http://highered.mheducation.com/sites/0073376221/student_view0/index.html

2. NPTEL lecture videos and notes on: https://nptel.ac.in/courses/106105080

3.Text book handouts: https://csc-knu.github.io/sys-prog/books/Andrew%20S.%20Tanenbaum%20-%20Computer%20Networks.pdf

Course Code: 23ADL401		Course Title: Intelligent systems - I Laboratory	
Course Category: Major		Course Level: Practice	
L:T:P(Hours/Week) 0: 0: 3	Credits:1.5	Total Contact Hours:45	Max Marks:100

Course Objectives:

This course introduces students to the practical knowledge of programming using advanced python programming language related with emerging artificial intelligence as an implementation tool. It aims at providing students with understanding of programming essentials used with applications used with real time scenario where AI plays a major role.

List of Experiments:

1. Identification of characteristics of data and perform data-preprocessing techniques for any given dataset
2. Perform data Classification using Decision Tree on the given dataset
3. Identification of frequent item set and generation of association rules using Apriori algorithm
4. Cluster the given data set using K-Means clustering algorithm
5. Visualize and analyze the results for the given dataset using different types of charts
6. Implementation of Breadth First and Depth First searching Techniques
7. Implementing state space search algorithms
    - Hill climbing algorithm
    - A* algorithm
8. Demonstrate the Min-Max algorithm
9. Knowledge representation and inference using first order logic
10. Develop simple AI applications

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Identify the types of data to be pre-processed for the given dataset	Apply
CO2: Build association rules and cluster the data for the given dataset	Apply
CO3: Apply the suitable type of search technique over the given scenario	Apply
CO4: Develop AI application to interact with environment	Apply

Reference Book(s):

R1. Stuart J. Russell, Peter Norvig, "Artificial Intelligence – A modern Approach", Third Edition, Pearson Education Inc., 2021

R2. Jiawei Han, Micheline Kamber, Jian Pei, "Data Mining: Concepts and Techniques", 3rd Edition, Elsevier, 2014

Web References:

1. Dataset resources: https://www.kaggle.com/datasets?fileType=csv
2. Programming Online Platform: https://colab.research.google.com/
3. Program code resources: https://github.com/topics/python-online
4. AI with python tutorial: https://www.geeksforgeeks.org/python-ai/

Course Code: 23ADL402		Course Title: Problem Solving using Python Laboratory	
Course Category: Major		Course Level: Introductory	
L:T:P(Hours/Week) 1: 0: 3	Credits: 2.5	Total Contact Hours: 60	Max Marks: 100

Course Objectives:

The course is intended to enable the students to develop programs in python.

Module I **8 Hours**

Computational Thinking and Problem Solving: Identification of Computational Problems - Algorithms, building blocks of algorithms - notation - algorithmic problem solving, simple strategies for developing algorithms.

Data Types, Expressions, Statements: Python interpreter and interactive mode - debugging - values and types - variables - expressions - statements - tuple assignment - precedence of operators - comments.

Module II **7 Hours**

Control Flow, Functions, Strings: Conditionals - Iteration - Functions - Strings.

Lists, Tuples, Dictionaries: List - operations, slices, methods, loop, mutability, aliasing, cloning, list parameters - Tuples - assignment - return value - Dictionaries - operations and methods - advanced list processing - list comprehension.

Files, Modules, Packages: Files and exceptions - text files, reading and writing files, format operator - command line arguments, errors and exceptions, handling exceptions, modules, packages and pickle.

List of Experiments: **45 Hours**

1. Develop a python program using simple statements and expressions
2. Implement scientific problems using Conditionals and Iterative loops
3. Implement real-time/technical applications using Lists, Tuples
4. Implement real-time/technical applications using Sets, Dictionaries
5. Implement python programs using Functions
6. Implement python programs using Strings
7. Implement python programs using written modules and Python Standard Libraries
8. Implement real-time/technical applications using File handling
9. Implement real-time/technical applications using Exception handling

10. Develop a game activity using Python

Course Outcomes	Cognitive Level
At the end of this course, students will be able to:	
CO1: Develop algorithmic solutions to solve computational problems and execute simple python programs	Apply
CO2: Build programs using conditionals and loops for solving problems	Apply
CO3: Utilize python data structures to deal with complex data	Apply
CO4: Develop interactive application using python	Apply

Course Articulation Matrix

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

High-3; Medium-2;Low-1

Text Book(s):

T1.Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016

T2.Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and Programming”, 1st Edition, BCS Learning & Development Limited, 2017

Reference Book(s):

R1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021

Web References:

1.Python Basics: https://www.python.org/

2.Python tutorial: https://www.geeksforgeeks.org/python-programming-language/

Course Code: 23ESL401		Course Title Professional Skills 3 : Professional Development and Etiquette (Common to all B.E/B.Tech Programmes)	
Course Category: SEC		Course Level: Introductory	
L:T:P(Hours/Week) 0: 0: 2	Credits: 1	Total Contact Hours:30	Max Marks:100

Course Objectives:

The course is intended to cultivate students' appropriate etiquette across various personal and professional contexts, fostering professionalism and effective communication.

Module I **15 Hours**

Emotional Intelligence

Intrapersonal Skill: Goal Setting- Self-management- Emotional Intelligence: Understanding & Developing EI for Effective Communication and Relationships – Enhancing Social Skills.

Professional Development

Introduction to Professional Development - Career State Assessment - Set Career Goals- Stay on Industry Trends - Self & Lifelong learning – Creativity - Problem Solving Skills - Strong Fundamentals – Using/ Creating Opportunities – Work & Life Balancing - Revisiting Goals.

Teamness and Interpersonal skills

Paraphrasing: Techniques for Active Listening -Paraphrasing as a Tool for Effective Understanding and Communication – Collaboration and Team Building: Building Trust and Rapport - Self-paced learning.

Module II **15 Hours**

Effective Communication

Effective Verbal Communication - Assertive Communication - Elements of Effective Communication - Barriers to Effective Communication - Persuasion Skills - Effective Presentation: Oral and visual presentation – Drafting formal reports.

Professional Etiquette

Introduction - Types of professional Etiquette- Personal Grooming: Importance of Personal Grooming in Professional Settings- Dress Codes and Professional Appearance Guidelines- Body language - Social – Email – Telephonic – Dining – Classroom - Business.

Activities:

- Emotional Intelligence: Scenario based role play, Debate
- Paraphrasing: Listening, Reading
- Effective Presentation:
  - Oral Presentation: Self-Introduction, JAM , Extempore speech
  - Visual presentation: Email Writing, Power Point Presentation, Vlog
- Professional Etiquette: Demonstrate required Professional Etiquette in all the above activities.

Course Outcomes	**Cognitive Level**
At the end of this course, students will be able to:	
CO1: Communicate effectively and exhibit Professional etiquettes in various social forums.	**Apply**

Course Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	2	3	-	1	-	-

High-3; Medium-2; Low-1

Textbook(s):

T1. Sabina Pillai, Agna Fernandez, “Soft Skills & Employability Skills”, Cambridge University Press

T2. Peggy Post &Peter Post, “The Etiquette Advantage in Business: Personal Skills for Professional Success”, 2nd Edition (May 3, 2005), William Morrow

Reference Book(s):

R1. Ashraf Rizvi, "Effective Technical Communication", 2nd Edition, McGraw-Hill India, 2018

R2. Maithry Shinde, Jyotsna Sreenath, “Life Skills & Personality Development”, Cambridge University Press 2022

Web References:

1. https://www.indeed.com/career-advice/career-development/etiquette-at-work
2. https://www.skillsyouneed.com/interpersonal-skills.html