



**SRI SHANMUGHA COLLEGE OF ENGINEERING AND
TECHNOLOGY**

(An Autonomous Institution)

Pullipalayam, Morur (Po.), Sankari (Tk.),
Salem (Dt.) - 637 304.

B.TECH.

**ARTIFICIAL INTELLIGENCE AND DATA
SCIENCE**

CURRICULUM

CHOICE BASED CREDIT SYSTEM

REGULATIONS 2023



SRI SHANMUGHA COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

Approved by AICTE, Affiliated to Anna University,
Accredited by NAAC, NBA (ECE/CSE/MECH) and ISO 9001:2015
Certified
Pullipalayam, Sankari, Salem (Dt.)

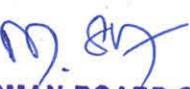
CURRICULUM AND SYLLABI

CHOICE BASED CREDIT SYSTEM

B.TECH.
ARTIFICIAL INTELLIGENCE AND DATA SCIENCE



REGULATION 2023


CHAIRMAN-BOARD OF STUDIES

Institute Vision

To be an institute of repute in all fields of education by implementing the best practices akin to global standards for fostering domain knowledge and developing research attitude among students to make them globally competent.

Institute Mission

- Achieving excellence in Teaching & Learning process using state-of-the-art resources.
- Extending opportunity to upgrade faculty knowledge and skills.
- Implementing the best student training practices for requirements of industrial scenario of the state.
- Motivating faculty and students in research activity for real time application.

Department of Artificial Intelligence and Data Science

Vision

Envision to have Global recognition by producing high quality, creative and ethical engineers and technologists to contribute effectively through innovations and research excellence in the advancing field of Artificial Intelligence and Data Science.

Mission

- M1** To empower the cognitive skills in the students in pioneering domain of Artificial Intelligence and Data Science by providing content based learning with quality teaching and learning opportunities, industry institute interaction activities and centers of excellence.
- M2** To transform professionals into technically competent to contribute to the society positively by inducing entrepreneurship skills through collaborative teaching, innovations and research.

Program Educational Outcomes (PEOs)

- PEO 1** Graduates will be able to demonstrate their technical skills and competency in various applications by providing creative and novel technological solutions.
- PEO 2** Graduates will be able to ensure the effective contribution to the society through critical

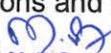
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thinking, innovations and research with the broad spectrum of skills in frontline technologies.

- PEO 3** Graduates will be equipped with multidisciplinary initiatives and visions towards the growth of society with respect to ethical and lifelong learning.

PROGRAM OUTCOMES (POs)

- PO 1 Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO 2 Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- PO 3 Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health, safety, cultural, societal and environmental considerations.
- PO 4 Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis, and interpretation of data and synthesis of the information to provide valid conclusions.
- PO 5 Modern tool usage:** Create, select, apply appropriate techniques, resources, modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO 6 The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO 7 Environment and sustainability:** Understand the impact of the professional engineering solutions in societal, environmental contexts, demonstrate the knowledge and need for sustainable development.
- PO 8 Ethics:** Apply ethical principles, commit to professional ethics, responsibilities and norms of the engineering practice.
- PO 9 Individual and team work:** Function effectively as an individual, as a member or leader in diverse teams and in multidisciplinary settings.
- PO 10 Communication:** Communicate effectively on complex engineering activities with the engineering community with society at large being able to comprehend, write effective reports, design documentation, make effective presentations and receive clear instructions.


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- PO 11 Project management and finance:** Demonstrate knowledge, understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO 12 Life-long learning:** Recognize the need, ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- PSO 1** Ability to identify, design and apply domain knowledge and computational skills to evolve novel intelligent solutions for Artificial Intelligence and Data Science related processes in our ecosystem.
- PSO 2** Ability to critique the role of Artificial Intelligence and Data Science in multi-disciplinary areas to transform thoughts into products through research and innovative career.



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B.TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATION – 2023
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CURRICULUM

I SEMESTER									
Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23EN101	Communicative English	HSMC	3	0	0	3	40	60	100
23MA201	Engineering Mathematics-I	BSC	3	1	0	4	40	60	100
23PH202	Physics for Information Science	BSC	3	0	0	3	40	60	100
23CY201	Chemistry for Engineers	BSC	3	0	0	3	40	60	100
23CS301	Problem Solving and Python Programming	ESC	3	0	0	3	40	60	100
23TA101	Heritage of Tamils/தமிழர் மரபு	HSMC	1	0	0	1	100	-	100
Practical Course(s)									
23PC201	Physics and Chemistry Laboratory	BSC	0	0	4	2	60	40	100
23CS302	Problem Solving and Python Programming Laboratory	ESC	0	0	4	2	60	40	100
23EN102	Communication Laboratory	HSMC	0	0	2	1	60	40	100
Mandatory Course									
23MC801	Induction Programme	MC	2 Weeks			0	100	-	100
TOTAL				16	1	10	22	580	420
				1000					

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II SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23MA202	Engineering Mathematics-II	BSC	3	1	0	4	40	60	100
23EC301	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	40	60	100
23CS401	Data Structures and Algorithms	PCC	3	0	0	3	40	60	100
23TA102	Tamils and Technology / தமிழரும் தொழில்நுட்பமும்	HSMC	1	0	0	1	100	-	100
23ME301	Engineering Graphics	ESC	3	1	0	4	40	60	100
Theory with Practical Course(s)									
23IT301	Programming in C	ESC	3	0	2	4	50	50	100
Practical Course(s)									
23ME302	Engineering Practices Laboratory	ESC	0	0	4	2	60	40	100
23CS402	Data Structures and Algorithms Laboratory	PCC	0	0	4	2	60	40	100
Employability Enhancement Course(s)									
23HS701	Soft skills-I	EEC	1	0	0	1	100	-	100
TOTAL			17	2	10	24	530	370	900

III SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23MA203	Discrete Mathematics	BSC	3	1	0	4	40	60	100
23CS404	Operating Systems	PCC	3	0	0	3	40	60	100
23IT403	Database Management Systems	PCC	3	0	0	3	40	60	100
23CS403	Computer Networks	PCC	3	0	0	3	40	60	100
Theory with Practical Course(s)									
23EC304	Digital Principles and Computer Organization	ESC	3	0	2	4	50	50	100
23CS405	Design and Analysis of Algorithms	PCC	3	0	3	4.5	50	50	100
Practical Course(s)									


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23IT404	Database Management Systems Laboratory	PCC	0	0	3	1.5	60	40	100
Employability Enhancement Course(s)									
23HS702	Soft skills-II	EEC	1	0	0	1	100	-	100
	TOTAL		19	1	8	24	420	380	800

IV SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23MA205	Probability, Queuing Theory and Statistics	BSC	3	1	0	4	40	60	100
23CS407	Software Engineering	PCC	3	0	0	3	40	60	100
23CS406	Object Oriented Programming	PCC	3	0	0	3	40	60	100
23AD401	Artificial Intelligence	PCC	3	0	0	3	40	60	100
23HS101	Universal Human Values-II	HSMC	3	0	0	3	40	60	100
Theory with Practical Course(s)									
23AD406	Data Mining and Data Warehousing	PCC	3	0	2	4	50	50	100
Practical Course(s)									
23AD407	Artificial Intelligence Laboratory	PCC	0	0	3	1.5	60	40	100
23CS409	Object Oriented Programming Laboratory	PCC	0	0	3	1.5	60	40	100
Employability Enhancement Course(s)									
23ME701	Design Thinking	EEC	2	0	0	2	40	60	100
	TOTAL		20	1	8	25	410	490	900

V SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23AD408	Fundamentals of Data Science and Analytics	PCC	3	0	0	3	40	60	100
23AD409	Machine learning	PCC	3	0	0	3	40	60	100
23AD6XX	Open Elective -I*	OEC	3	0	0	3	40	60	100

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Theory with Practical Course(s)

23AD410	Data Exploration and Visualization	PCC	3	0	2	4	50	50	100
23AD415	Big Data Analytics	PCC	3	0	2	4	50	50	100
23AD5XX	Professional Elective I	PEC	2	0	2	3	50	50	100

Practical Course(s)

23AD411	Data Science and Analytics Laboratory	PCC	0	0	3	1.5	60	40	100
23AD412	Machine Learning Laboratory	PCC	0	0	3	1.5	60	40	100

Employability Enhancement Course(s)

23HS703	Soft skills-III	EEC	1	0	0	1	100	-	100
	TOTAL		18	0	12	24	490	410	900

*Open Elective - Shall be chosen from the list of open electives offered by other Programs

VI SEMESTER

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total

Theory Course(s)

23AD5XX	Open Elective –II	OEC	3	0	0	3	40	60	100
23AD6XX	Open Elective – III	OEC	3	0	0	3	40	60	100

Theory with Practical Course(s)

23CS410	Embedded Systems and IoT	ESC	3	0	2	4	50	50	100
23AD414	Deep Learning	PCC	3	0	2	4	50	50	100
23AD5XX	Professional Elective II	PEC	2	0	2	3	50	50	100

Employability Enhancement Course(s)

23AD701	Mini Project	EEC	0	0	4	2	100	-	100
23HS704	Soft skills-IV	EEC	1	0	0	1	100	-	100

Employability Enhancement Course(s)

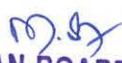
23MC802	Environmental Sciences and Disaster Management	MC	2	0	0	0	100	-	100
	TOTAL		17	0	10	20	530	270	800

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VII SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Theory Course(s)									
23HS103	Entrepreneurship and IPR	HSMC	3	0	0	3	40	60	100
23AD6XX	Open Elective – IV	OEC	3	0	0	3	40	60	100
Theory with Practical Course(s)									
23AD5XX	Professional Elective III	PEC	2	0	2	3	50	50	100
23AD6XX	Professional Elective IV	PEC	2	0	2	3	50	50	100
23AD6XX	Professional Elective V	PEC	2	0	2	3	50	50	100
Employability Enhancement Course(s)									
23AD702	Internship	EEC	2 Weeks			1	100	-	100
Mandatory Course									
23MC804	Indian constitution	MC	1	0	0	0	100	-	100
TOTAL			13	0	6	16	430	270	700

VIII SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
Employability Enhancement Course(s)									
23AD703	Project Work	EEC	0	0	20	10	60	40	100
TOTAL			0	0	20	10	60	40	100

Total Credits: 165



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PROFESSIONAL ELECTIVES									
Vertical – I Vertical for Artificial Intelligence & Machine Learning									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23AD511	Natural Language Processing	PEC	2	0	2	3	50	50	100
23AD512	Recommender Systems	PEC	2	0	2	3	50	50	100
23AD513	Knowledge Engineering	PEC	2	0	2	3	50	50	100
23AD514	Reinforcement Learning	PEC	2	0	2	3	50	50	100
23AD515	AI for Robotics	PEC	2	0	2	3	50	50	100
23AD516	Generative AI	PEC	2	0	2	3	50	50	100

Code No.	Course	Category	L	T	P	C	CIA	ESE	Total
23AD511	Natural Language Processing	PEC	2	0	2	3	50	50	100
23AD512	Recommender Systems	PEC	2	0	2	3	50	50	100
23AD513	Knowledge Engineering	PEC	2	0	2	3	50	50	100
23AD514	Reinforcement Learning	PEC	2	0	2	3	50	50	100
23AD515	AI for Robotics	PEC	2	0	2	3	50	50	100
23AD516	Generative AI	PEC	2	0	2	3	50	50	100

Vertical – II Vertical for Data Science									
23AD521	Pattern Recognition	PEC	2	0	2	3	50	50	100
23AD522	Social Network Analytics	PEC	2	0	2	3	50	50	100
23AD523	Cyber Threat Analytics	PEC	2	0	2	3	50	50	100
23AD524	Business Analytics	PEC	2	0	2	3	50	50	100
23AD525	Image and video analytics	PEC	2	0	2	3	50	50	100
23AD526	Health Care Analytics	PEC	2	0	2	3	50	50	100

23AD521	Pattern Recognition	PEC	2	0	2	3	50	50	100
23AD522	Social Network Analytics	PEC	2	0	2	3	50	50	100
23AD523	Cyber Threat Analytics	PEC	2	0	2	3	50	50	100
23AD524	Business Analytics	PEC	2	0	2	3	50	50	100
23AD525	Image and video analytics	PEC	2	0	2	3	50	50	100
23AD526	Health Care Analytics	PEC	2	0	2	3	50	50	100

Vertical – III Full Stack Development for IT									
23AD531	Full stack Development	PEC	2	0	2	3	50	50	100
23AD532	App Development	PEC	2	0	2	3	50	50	100
23AD533	Web Frameworks	PEC	2	0	2	3	50	50	100
23AD534	UI and UX Design	PEC	2	0	2	3	50	50	100
23AD535	Software Testing and Automation	PEC	2	0	2	3	50	50	100
23AD536	DevOps	PEC	2	0	2	3	50	50	100

23AD531	Full stack Development	PEC	2	0	2	3	50	50	100
23AD532	App Development	PEC	2	0	2	3	50	50	100
23AD533	Web Frameworks	PEC	2	0	2	3	50	50	100
23AD534	UI and UX Design	PEC	2	0	2	3	50	50	100
23AD535	Software Testing and Automation	PEC	2	0	2	3	50	50	100
23AD536	DevOps	PEC	2	0	2	3	50	50	100

Vertical – IV Cloud Computing and Data Center Technologies									
23AD541	Cloud Computing	PEC	2	0	2	3	50	50	100

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23AD542	Cloud Virtualization	PEC	2	0	2	3	50	50	100
23AD543	Cloud Service Management	PEC	2	0	2	3	50	50	100
23AD544	Storage Technologies	PEC	2	0	2	3	50	50	100
23AD545	Software Defined Networks	PEC	2	0	2	3	50	50	100
23AD546	Cloud Strategy Planning and Management	PEC	2	0	2	3	50	50	100

Vertical – V Cyber Security and Data Privacy

23AD551	Vulnerability Assessment and Penetration Testing	PEC	2	0	2	3	50	50	100
23AD552	Digital and Mobile Forensics	PEC	2	0	2	3	50	50	100
23AD553	Social Network Security	PEC	2	0	2	3	50	50	100
23AD554	Modern Cryptography	PEC	2	0	2	3	50	50	100
23AD555	Information Security	PEC	2	0	2	3	50	50	100
23AD556	Cyber Physical Systems	PEC	2	0	2	3	50	50	100

Vertical – VI Creative Media

23AD561	Multimedia and Animation	PEC	2	0	2	3	50	50	100
23AD562	Video Creation and Editing	PEC	2	0	2	3	50	50	100
23AD563	Visual Effects	PEC	2	0	2	3	50	50	100
23AD564	Multimedia Data Compression and Storage	PEC	2	0	2	3	50	50	100
23AD565	Digital Marketing	PEC	2	0	2	3	50	50	100
23AD566	3D Animation	PEC	2	0	2	3	50	50	100

Vertical – VII Emerging Technologies

23AD571	Augmented Reality/Virtual Reality	PEC	2	0	2	3	50	50	100
23AD572	Cryptocurrency and Blockchain Technologies	PEC	2	0	2	3	50	50	100
23AD573	Cyber Security	PEC	2	0	2	3	50	50	100
23AD574	Quantum Computing	PEC	2	0	2	3	50	50	100
23AD575	Cognitive Science	PEC	2	0	2	3	50	50	100

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Passed in Board of studies Meeting on 26.10.2023 Approved in Academic Council Meeting on 07.11.2023

23AD576	Game Development	PEC	2	0	2	3	50	50	100
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OPEN ELECTIVE COURSES OFFERED BY AGRICULTURAL ENGINEERING

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23AG601	Principles of Food Preservation	OEC	3	0	0	3	40	60	100
23AG602	Organic Farming	OEC	3	0	0	3	40	60	100
23AG603	Renewable Energy Technology	OEC	3	0	0	3	40	60	100
23AG604	Urban Horticulture	OEC	3	0	0	3	40	60	100
23AG605	Roof Top Gardening Techniques	OEC	3	0	0	3	40	60	100
23AG606	Value Addition in Agricultural Products	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY BIOMEDICAL ENGINEERING

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23BM601	Sensors and Transducers	OEC	3	0	0	3	40	60	100
23BM602	Fundamentals of Healthcare Analytics	OEC	3	0	0	3	40	60	100
23BM603	ICU Equipment	OEC	3	0	0	3	40	60	100
23BM604	Basics of Biomedical Engineering	OEC	3	0	0	3	40	60	100
23BM605	Fundamentals of Medical Imaging Systems	OEC	3	0	0	3	40	60	100
23BM606	Medical Electronics	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY ELECTRONICS AND COMMUNICATION ENGINEERING

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CI A	ESE	Total

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23EC601	Fundamentals of Communication Systems	OEC	3	0	0	3	40	60	100
23EC602	Remote Sensing Concepts	OEC	3	0	0	3	40	60	100
23EC603	Wireless Networks	OEC	3	0	0	3	40	60	100
23EC604	Consumer Electronics	OEC	3	0	0	3	40	60	100
23EC605	Fundamentals of Image Processing	OEC	3	0	0	3	40	60	100
23EC606	Machine Vision System	OEC	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES OFFERED BY MECHANICAL ENGINEERING

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23ME601	Industrial Safety	OEC	3	0	0	3	40	60	100
23ME602	Electric Vehicle Technology	OEC	3	0	0	3	40	60	100
23ME603	Digital Manufacturing	OEC	3	0	0	3	40	60	100
23ME604	Fundamentals of Robotics	OEC	3	0	3	3	40	60	100
23ME605	Total Quality Management	OEC	3	0	3	3	40	60	100
23ME606	Engineering Economics	OEC	3	0	3	3	40	60	100

OPEN ELECTIVE COURSES (For Other Programmes)

Course Code	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CIA	ESE	Total
23AD601	Artificial Intelligence for Everyone	OEC	3	0	0	3	40	60	100
23AD602	Fundamentals of Machine Learning	OEC	3	0	0	3	40	60	100
23AD603	Data Science for Engineers	OEC	3	0	0	3	40	60	100
23AD604	Artificial Intelligence in Healthcare	OEC	3	0	3	3	40	60	100
23AD605	Business Intelligence and Analytics	OEC	3	0	3	3	40	60	100
23AD606	Java Programming	OEC	3	0	3	3	40	60	100


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MINOR DEGREE IN DATA SCIENCE								
Course Code	Course	Periods / Week			C	Maximum Marks		
		L	T	P		CIA	ESE	Total
1	Database Management Systems	3	0	0	3	40	60	100
2	Data Mining and Data Warehousing	3	0	0	3	40	60	100
3	Fundamentals of Data Science and Analytics	3	0	0	3	40	60	100
4	Cloud Computing	3	0	3	3	40	60	100
5	Data Exploration and Visualization	3	0	3	3	40	60	100
6	Big Data Analytics	3	0	3	3	40	60	100

SUMMARY

S.No	Category	Credits per semester								Total Credits	Credits as per AICTE
		I	II	III	IV	V	VI	VII	VIII		
1	HSMC	5	1	0	3	0	0	3	0	12	15
2	BSC	12	4	4	4	0	0	0	0	24	23
3	ESC	5	13	4	0	0	4	0	0	26	22
4	PCC	0	5	15	16	17	4	0	0	57	54
5	PEC	0	0	0	0	3	3	9	0	15	18
6	OEC	0	0	0	0	3	6	3	0	12	15
7	EEC	0	1	1	2	1	3	1	10	19	16
8	MC	✓	-	-	-	-	✓	✓	-	0	0
Total		22	24	24	25	24	20	16	10	165	163

HSM - Humanities and Social Sciences

BS - Basic Science Courses

ES - Engineering Science Courses

PC - Professional Core Courses

PE - Professional Elective Courses

OE - Open Elective Courses

EE - Employability Enhancement Courses

MC - Mandatory Courses (Non-Credit Courses)

CIA - Continuous Internal Assessment

ESE - End Semester Examination



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I SEMESTER

23EN101	COMMUNICATIVE ENGLISH (Common to all B.E./B.Tech Programmes)	L 3	T 0	P 0	C 3
Category	HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSE (HSMC)				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Enable the students to assimilate the correct patterns of the language.
- Develop students' insight into the structure of the English language.
- Enrich vocabulary bank, to communicate more effectively in English,
- Express opinions including facts & ideas & maintain conversation in everyday situations.
- Use digital literacy tools their LSRW skills can be enhanced and to master good speaking skills with different strategies.

Course Outcomes (COs)

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

CO. No	Course Outcome	Bloom's Level
CO 1	Outline the basics of English communication	Understand
CO 2	Contrast the ways in which written and spoken communication differ.	Understand
CO 3	Relate the descriptive and analytical words, phrases, and sentence structures.	Understand
CO 4	Identify various text kinds and understand their connotative and denotative implications.	Apply
CO 5	Utilize several text kinds using the proper formats.	Apply

Course Contents

Unit – I	Basics of Communication	9
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Listening – Telephone conversation & Writing message, gap filling; Reading – Telephone message, bio-note; Writing – Personal profile; Grammar – Simple present tense, Present continuous tense, Asking questions (wh-questions); Vocabulary – GRE Vocabulary.

Unit – II	Narration	9
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Listening – Travel/Fiction podcast, Watching a travel documentary; Reading – An excerpt from a travelogue, Newspaper Report; Writing – Narrative (Event, personal experience etc.); Grammar – Subject – verb agreement, Simple past, Past continuous Tenses; Vocabulary – Antonyms, Word formation (Prefix and Suffix).

Unit – III	Description	9
Listening – Conversation, Radio/TV advertisement/BBC Documents; Reading – A tourist brochure and planning an itinerary, descriptive article / excerpt from literature; Writing – Definitions, Descriptive writing, Checklists; Grammar – Future tense, Perfect tenses, Preposition; Vocabulary – Adjectives and Adverbs.		

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Unit – IV	Classification	9
Listening – Announcements and filling a table; Reading – An article, social media posts and classifying (channel conversion – text to table), IELTS & TOEFL, BEC materials; Writing – Note making, Note taking and Summarising, a classification paragraph; Grammar – Connectives, Transition words; Vocabulary – Contextual vocabulary, Words used both as noun and verb, Classification related words.		
Unit – V	Expression of Views	9
Listening – Debate / Discussion; Reading – Formal letters, Letters to Editor, Opinion articles / Blogs; Writing – Letter writing/ Email writing (Enquiry / Permission, Letter to Editor), Resume Writing; Grammar – Question tags, Indirect questions, Yes / No questions; Vocabulary – Compound words, Phrasal verbs, Articles-Review of Movie/Documentary/Short-films.		
Total : 45 Hours		

Text Books

1. Anna University, Division of Humanities and Social Sciences. English for Engineers and Technologists. Vol. 1: A Skills Approach, Orient Longman, 2002.
2. Trimble, Louis, English for Science and Technology. Vol. 1: A Discourse Approach, Cambridge University Press. 2023.
3. Kumar, Sanjay & Lata, Pushp. Communication Skills. New Delhi: Oxford University Press, 2018.

Reference Books

1. C.Richards Jack. Interchange Fifth Edition, Cambridge University Press, 2017.
2. Wallwork Adrian, Springer. English for Academic Correspondence and Socializing. Cambridge University Press. 2011.
3. Cortrell, Stella. The Study Skills Handbook. Fourth Edition, Red Globe Press, 2013.
4. Kumar, Sanjay & Lata, Pushp. Communication Skills, Oxford University Press, 2011.

Additional / Web References

1. <https://nptel.ac.in/courses/109106094>
2. nptel.ac.in/courses/109/104/109104090/
3. <http://www.uefap.com/grammar/gramfram.htm>

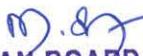
Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)													PSOs		
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	-	-	-	-	2	-	-	-	2	3	-	3			
CO 2	-	-	-	-	2	-	-	-	2	3	-	3			
CO 3	-	-	-	-	2	-	-	-	2	3	-	3			
CO 4	-	-	-	-	2	-	-	-	2	3	-	3			
CO 5	-	-	-	-	2	-	-	-	2	3	-	3			
Average	-	-	-	-	2	-	-	-	2	3	-	3			

3 – High

2 – Medium

1 – low

“-” - No Correlation


CHAIRMAN-BOARD OF STUDIES

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
Total			40		60	

23MA201	ENGINEERING MATHEMATICS- I (Common to all B.E/ B.Tech Programmes)	L	T	P	C
		3	1	0	4
Category	Basic science (BS)				
Pre requisites	Nil				

Course Objectives

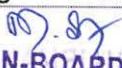
The course is intended to

- Develop the use of matrix algebra techniques that are needed by engineers for practical applications.
- Familiarize the student with differentiation rules.
- Familiarize the student with functions of several variables this is needed in many branches of engineering.
- Acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.
- Acquire the knowledge of ordinary differential equation in both variable and constant coefficients.

Course Outcomes (COs)

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

CO. No	Course Outcome	Bloom's Level
CO 1	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.	Apply
CO 2	Interpret various concepts of differential calculus like limit, continuity, differentiability, Successive differentiation and study it's applicability in maxima and minima of one variable.	Understand
CO 3	Construct the application of partial differentiation and apply for evaluating maxima and minima of functions of multi variables.	Apply
CO 4	Make use of the concept of change of order of integration to evaluate multiple integrals and their usage in computing the area and volume.	Apply


CHIEF EXCUTIVE CHAIRMAN-BOARD OF STUDIES

CO 5	Illustrate ordinary differential equations to solve constant and variable coefficient problems.	Understand
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Course Contents

Unit – I	Matrices	9+3
Characteristic equation -Eigenvalues and Eigenvectors of a real matrix – Properties of Eigenvalues and Eigenvectors - Diagonalization of matrices- Reduction of a quadratic form to canonical form by orthogonal transformation- Nature of quadratic form-Cayley -Hamilton theorem.		
Unit – II	Differential Calculus	9+3
Representation of functions -Limit of a function - Continuity- Derivatives -Differentiation rules - Taylor's series - Maclaurin series- Maxima and Minima of functions of one variable.		
Unit – III	Multivariable Calculus	9+3
Partial differentiation - Homogeneous functions and Euler's theorem - Jacobians -Taylor's series for functions of two variables - Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.		
Unit – IV	Multiple Integrals	9+3
Double integrals - Area enclosed by plane curves- Double integrals in polar coordinates - Change of order of integration -Triple integrals - Volume of solids (Cartesian Co-ordinates only).		
Unit – V	Ordinary Differential Equations	9+3
Higher order linear differential equations with constant coefficients -Homogeneous Equation of Euler's and Legendre's Types of linear equations with Variable Coefficients - Method of variation of parameters.		
Total : 60 Periods		

Text Books

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S. "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendentals ", Cengage Learning, 8th Edition, New Delhi, 2015.

Reference Books

1. Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016.
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media, New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.

Additional / Web References

1. <https://nptel.ac.in/courses/122104018>
2. <https://nptel.ac.in/courses/111105122>
3. <https://nptel.ac.in/courses/111107108>

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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	1	2	3	4	5	6	7	8	9	10	11	12
CO 2	3	2							1	1		
CO 3	3	2							1	1		
CO 4	3	2							1	1		
CO 5	3	2							1	1		
Average	3	2							1	1		

"3" – High

"2" – Medium

"1" – low

"-“ - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
Total			40		60	

23PH202	PHYSICS FOR INFORMATION SCIENCE (Common to CSE, IT, AI&DS,CYBER)	L	T	P	C
		3	0	0	3
Category	Basic Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Enable the students to gain knowledge of electromagnetic waves and its applications.

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- Introduce the basics of oscillations, optics and lasers.
- Equip the students to be successfully understand the importance of quantum physics.
- Make the students to understand the basics of crystallography and its importance in studying materials properties.
- Make the students understand the importance in studying electrical and semiconducting properties of materials.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Utilize the concept in electromagnetic waves to understand interaction of electromagnetic waves with matter.	Understand
CO 2	Interpret the foundational knowledge of physics to recognize phenomena of oscillations, optics and lasers.	Understand
CO 3	Explain the concepts of waves and matter in atomic and subatomic level.	Understand
CO 4	Identify the different crystal structures of materials and its role in their physical properties.	Understand
CO 5	Reveal the concepts of carrier transport in conducting and semiconducting materials.	Understand

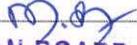
Course Contents

Unit – I	Electromagnetic Waves	9
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The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

Unit – II	Oscillations, Optics and Lasers	9
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Simple harmonic motion - resonance -analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference -Michelson interferometer -Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO₂ laser, semiconductor laser -Basic applications of lasers in industry.


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Unit – III	Quantum Mechanics	9
Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.		
Unit – IV	Crystallography	9
Crystal structures: Crystal lattice – basis - unit cell and lattice parameters – crystal systems and Bravais lattices – Structure and packing fractions of SC, BCC, FCC, HCP and diamond structures – crystal planes, directions and Miller indices –Techniques for growing crystals - Bridgman method, Czochralski method, vapor deposition. X-ray diffraction: Bragg's Law-Von Laue Equations-X-ray diffraction methods-Laue's Method- powder method		
Unit – V	Conducting and Semiconducting Materials	9
Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Wiedemann-Franz law – Success and failures - electrons in metals – Particle in a three dimensional box – degenerate states – Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids. Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors – Variation of carrier concentration with temperature		
Total : 45 Hours		

Text Books
<ol style="list-style-type: none"> Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw-Hill (Indian Edition), 2017. Gaur R K, Gupta S L "Engineering Physics", Dhanpat Rai Publications., 2013. Hugh D. Young, Roger A. Freedman, Lewis Ford .A "University Physics with Modern Physics", Pearson Education., India, 2008. R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.
Reference Books
<ol style="list-style-type: none"> Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015. Solid State Physics, R.K.Puri, V.K Babbar, S.Chand& Company Ltd., 2008 Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.
Additional / Web References
<ol style="list-style-type: none"> https://archive.nptel.ac.in/courses/115/106/115106119/ https://archive.nptel.ac.in/courses/115/101/115101005/ https://archive.nptel.ac.in/courses/115/102/115102124/ https://archive.nptel.ac.in/courses/115/101/115101107/


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COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	-	-	-	-	-	-	-	2	-	-	2
CO 2	3	-	-	-	-	-	-	-	2	-	-	2
CO 3	3	-	-	-	-	-	-	-	2	-	-	2
CO 4	3	-	-	-	-	-	-	-	2	-	-	2
CO 5	3	-	-	-	-	-	-	-	2	-	-	2
Average	3	-	-	-	-	-	-	-	2	-	-	2

3 – High 2 – Medium 1 – low “ – No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
Total			40		60	

23CY201	CHEMISTRY FOR ENGINEERS (Common to all B.E.,/B.Tech Programmes)	L	T	P	C
		3	0	0	3
Category	Basic Sciences				
Pre requisites	Nil				

Course Objectives	
The course is intended to	<ul style="list-style-type: none"> Impart knowledge on the various sources of water and its impurities. Impart knowledge on the basic principles and preparatory methods of nanomaterials.
Pre-requisites	Nil

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- Facilitate the understanding of different types of fuels, their preparation, properties and Combustion characteristics.
- Familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.
- Familiarize different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.

Course Outcomes (COs)

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

CO. No	Course Outcome	Bloom's Level
CO 1	Recognize water quality parameters and water treatment techniques for the polluted water.	Understand
CO 2	Outline the various synthesis processes of nanomaterial and enumerate its applications in various fields.	Understand
CO 3	Illustrate the composition, calorific values, uses of natural fuels and the manufacture of synthetic and bio fuels.	Understand
CO 4	Infer the knowledge of operating ideology, working process and application of energy conversion and storage devices.	Understand
CO 5	Reveal the basic concepts, processing of polymer and its chemistry in engineering and technology.	Understand

Course Contents

Unit – I	Water treatment	9
Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.		
Unit – II	Nanochemistry	9
Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.		
Unit – III	Fuels and combustion	9

D.S.
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Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil – cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO₂ emission and carbon foot print.

Unit – IV	Energy sources and storage devices	9
Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion battery; Electric vehicles – working principles; Fuel cells: H ₂ -O ₂ fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.		
Unit – V	Polymer chemistry	9
Introduction: Functionality-degree of polymerization. Classification of polymers (Source, Structure, Synthesis and Intermolecular forces). Mechanism of free radical addition polymerization. Properties of polymers: Tg, tacticity, molecular weight-number average, weight average, viscosity average and polydispersity index (Problems). Techniques of polymerization: Bulk, emulsion, solution and suspension. Engineering Plastics: Polyamides, Polycarbonates and Polyurethanes. Compounding and Fabrication Techniques: Injection, Extrusion, Blow and Calendering.		
Total : 45 Hours		

Text Books

1. P. C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

Reference Books

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
3. O.V. Roussak and H.D. Gesser, Applied Chemistry: A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

Additional / Web References

1. <https://nptel.ac.in/courses/122101001>


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COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	2	-	-	-	-	2	-	1	-	-	1
CO 2	3	-	-	-	-	-	-	-	-	-	-	1
CO 3	3	-	-	-	-	-	2	-	1	-	-	1
CO 4	3	-	-	-	-	-	2	-	-	-	-	1
CO 5	3	-	-	-	-	-	-	-	1	-	-	1
Average	3	-	-	-	-	-	2	-	1	-	-	1

3 – High

2 – Medium

1 – low

“-” - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*	
CIA I	3 hours	2.5 units	100	12	24	60	
CIA II	3 hours	2.5 units	100	12			
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)				16			
Total				40		60	

23CS301	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to all B.E/ B.Tech Programmes)	L	T	P	C					
Category	Engineering Science									
Pre requisites	Nil									
Course Objectives										
The course is intended to <ul style="list-style-type: none"> Understand the basics of algorithmic problem solving. Develop and solve problems using python conditionals and loops. Develop and use function calls to solve problems. Construct python data structures - lists, tuples, dictionaries to represent complex data. Implement input/output with file exceptions in python. 										
Course Outcomes (COs)										
On successful completion of the course, students will be able to										

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CO. No	Course Outcome	Bloom's Level
CO 1	Develop logical solutions to simple and complex computational problems.	Apply
CO 2	Develop and execute python programs using conditionals and loops	Apply
CO 3	Implement python programs using functions for searching operations	Apply
CO 4	Execute the lists, tuples and dictionary created in python	Apply
CO 5	Implement a module to read & write data with exceptions.	Apply

Course Contents

Unit – I	Basic Programming Representations	9
Fundamentals of Computer, Identification of Computational Problems, Algorithms, building blocks of algorithms (statements, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.		
Unit – II	Different Data Types	9
Introduction to python, Python interactive and script mode, data types: numeric, boolean, string, list, tuple, dictionary and set; identifier, variables, keywords, expressions, statements, assignment, precedence of operators, comments, indentation; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.		
Unit – III	Functional Flow	9
Conditionals: Boolean values and Operators, if statement, alternative statement, nested statements, chained conditional; Iteration: state, while, for, break, continue, pass; Input and Output; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string methods, string module; Lists as arrays, creation of arrays and operations on arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.		
Unit – IV	Types of Data Structures	9
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters, advanced list processing - list comprehension (Map, Filter, Lambda and Reduce); Tuples: tuple introduction, tuple assignment, tuple as return value; Dictionaries: operations and methods; Sets: set introduction, set operations; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.		
Unit – V	Files, Modules, Packages	9
Files: text files, reading and writing files, file positions, format operator, directory methods, command line arguments, Exceptions: errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).		
Total : 45 Periods		

Text Books

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

Reference Books

 CHAIRMAN-BOARD OF STUDIES

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021.

Additional / Web References

1. <https://learnengineering.in/ge3151-problem-solving-and-python-programming/>
2. <https://www.scribd.com/document/546667558/GE3151-PROBLEM-SOLVING-AND-PYTHON-PROGRAMMING>
3. <https://padeepz.net/ge3151-notes-problem-solving-and-python-programming-regulation-2021-anna-university/>
4. https://onlinecourses.nptel.ac.in/noc21_cs32/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	3	3	3	2	-	-	-	-	-	2	2
CO 2	3	3	3	3	2	-	-	-	-	-	2	2
CO 3	3	3	3	3	2	-	-	-	-	-	2	2
CO 4	2	2	-	2	2	-	-	-	-	-	2	2
CO 5	3	2	-	-	2	-	-	-	-	-	2	2
Average	2	3	3	3	2	-	-	-	-	-	2	2

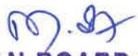
3 – High

2 – Medium

1 – Low

'-' - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)					16	
					Total	40
						60


CHAIRMAN-BOARD OF STUDIES

தமிழ் மரபு

23TA101

L T P C

1001

அலகு 1 மொழி மற்றும் இலக்கியம்:

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்ப்பு தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறும் - 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 - சிற்பக்கலை:

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஜம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சூடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கள், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3 நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:

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

அலகு 4 தமிழர்களின் திணைக் கோட்பாடுகள்:

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் - சங்ககால நகரங்களும் துறைமுகங்களும் - சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5 இந்திய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:

இந்திய விவடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநால் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr. K.K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr. S.V. Subatamanian, Dr. K.D. Thirunavukkarasu), (Published by: International Institute of Tamil Studies)
8. The Contributions of Tamils of 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, Tamilnadu).
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, Tamilnadu).
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by RMRL) – Reference Book.

HERITAGE OF TAMILS

23TA101

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UNIT I LANGUAGE AND LITERATURE

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 Bharathiyan and Bharathidhasan.

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

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

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS

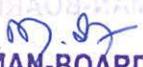
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

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

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.

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநால் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருஞ் – 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 Tamils of 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, Tamilnadu).
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, Tamilandu).
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by RMRL) – Reference Book.



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23PC201	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
	(Common to all B.E./B.Tech Programmes)	0	0	4	2
Category	Basic sciences				
Pre requisites	Physics and chemistry				

Course Objectives

The course is intended to

- Measure various physical parameter of solid and matter waves.
- Identify the velocity of ultrasonic waves in different liquid medium.
- Measure acceptance angle, groove width and wave length of laser.
- Demonstrate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO and chloride.
- Familiarize with electro analytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.

Course Outcomes (COs)

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

CO. No.	Course Outcome	Bloom's Level
CO 1	Develop the experimental skills on physical properties of materials and matter waves.	Apply
CO 2	Make use of concepts of sound to measure physical properties of given liquids.	Apply
CO 3	Identify various physical parameters of object with concepts of optics.	Apply
CO 4	Analyze the quality of water samples with respect to their acidity, alkalinity, hardness and DO.	Apply
CO 5	Determine the amount of metal ion through volumetric techniques.	Apply

List of Experiments in physics (Any Seven Experiments)

S.No	List of Exercises	CO	Blooms Taxonomy
1.	Simple harmonic oscillations of cantilever.	CO 1	Apply
2.	Non-uniform bending - Determination of Young's modulus.	CO 1	Apply
3.	Melde's string experiment.	CO 1	Apply
4.	Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.	CO 2	Apply
5.	Photoelectric effect.	CO 3	Apply
6.	Air wedge - Determination of thickness of a thin sheet/wire.	CO 3	Apply
7.	a) Optical fibre -Determination of Numerical Aperture and acceptance angle b) Compact disc- Determination of width of the groove using laser.	CO 3	

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			Apply
8.	Laser- Determination of the wave length of the laser using grating.	CO 3	Apply
Total : 30 Periods			

List of Experiments in Chemistry (Any Seven Experiments)

S.No	List of Exercises	CO	Blooms Taxonomy
1.	Preparation of Na ₂ CO ₃ as a primary standard and estimation of acidity of a water sample using the primary standard.	CO 4	Apply
2.	Determination of types and amount of alkalinity in a water sample - Split the first experiment into two.	CO 4	Apply
3.	Determination of total, temporary & permanent hardness of water by EDTA method.	CO 4	Apply
4.	Determination of DO content of water sample by Winkler's method.	CO 4	Apply
5.	Determination of chloride content of water sample by Argentometric method.	CO 4	Apply
6.	Determination of strength of given hydrochloric acid using pH meter.	CO 5	Apply
7.	Determination of strength of acids in a mixture of acids using conductivity meter.	CO 5	Apply
8.	Estimation of iron content of the given solution using potentiometer.	CO 5	Apply
Total : 30 Periods			

Mapping of Course Outcomes (COs) with Programme Outcomes (POs)

CO	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	2	2	-	-	-	-	-	-	2	-	-	-
CO 2	2	2	-	-	-	-	-	-	2	-	-	-
CO 3	2	2	-	-	-	-	-	-	2	-	-	-
CO 4	2	2	-	-	-	-	-	-	2	-	-	-
CO 5	2	2	-	-	-	-	-	-	2	-	-	-
Average	2	2	-	-	-	-	-	-	2	-	-	-

3 – High

2 – Medium

1 – Low

'-' – No Correlation

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S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
Total				60	40

23CS302	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (Common to all B.E/ B.Tech Programmes)	L	T	P	C
		0	0	3	1.5
Category	Engineering Science				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Develop the problem-solving skills to complex problems
- Develop the basic programming constructs in Python.
- Implement various gaming strategies in python to solve real world problems.
- Model a data structure using lists, tuples, dictionaries in python.
- Make use of input / output operations with files in Python.

Course Outcomes (COs)

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

CO No.	Course Outcome	Bloom's Level
CO 1	Develop algorithmic solutions to simple computational problems	Apply
CO 2	Implement programs in Python using conditionals and loops for solving problems.	Apply
CO 3	Implement programs in Python for real time applications using functions	Apply
CO 4	Implement programs in Python for real time applications using exception handling.	Apply
CO 5	Develop gaming applications using Python	Apply


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S.No	List of Exercises	CO	Bloom's Taxonomy
1.	Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, Sin series, weight of a motorbike, Weight of a steel bar, compute Electrical Current in Three Phase AC Circuit, etc.)	CO 1	Apply
2.	Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).	CO 2	Apply
3.	Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)	CO 2	Apply
4.	Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building – operations of list & tuples)	CO 3	Apply
5.	Implementing programs using Functions. (Factorial, largest number in a list, area of shape)	CO 3	Apply
6.	Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)	CO 4	Apply
7.	Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)	CO 4	Apply
8.	Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation)	CO 4	Apply
9.	Exploring Pygame tool.	CO 4	Apply
10.	Developing a game activity using Pygame like bouncing ball, car race etc.	CO 5	Apply

Total : 45 Periods

Reference Books
1. Manual-prepared by SSCET
Additional / Web References
1. http://nptel.ac.in/courses/112104113/ 2. http://nptel.ac.in/courses/112108148/



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CO	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	3	3	3	2	-	-	-	-	-	2	2
CO 2	3	3	3	3	2	-	-	-	-	-	2	2
CO 3	3	3	3	3	2	-	-	-	-	-	2	-
CO 4	2	2	-	2	2	-	-	-	-	-	2	-
CO 5	2	2	-	-	2	-	-	-	-	-	2	-
CO 6	2	2	-	-	2	-	-	-	-	-	2	-
Average	2	3	3	3	2	-	-	-	-	-	2	2

3 – High

2 – Medium

1 – low

‘-’ - No Correlation

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
Total			60		40

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23EN102	Communication Laboratory (Common to All B.E/B.Tech Programs)	L	T	P	C
		0	0	2	1
Category	HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSE (HSMC)				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Improve the communicative competence of learners
- Help learners use language effectively in academic /work contexts
- Develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- Build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- Use language efficiently in expressing their opinions via various media.

Course Contents

Unit – I	Introduction to Fundamental of Communication	6
Listening - Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form; BBC Radio/Research find YouTube channel.		
Speaking - making telephone calls-Self Introduction; Introducing a friend; - 42 politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions(filling out a bank application for example), PPT Presentation.		
Unit – II	Narration	6
Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities, Oral writing (Extract videos), and Document national statement. Listening to TED Talks. Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings engaging in small talk- describing requirements and abilities, making predictions- talking about a given topic-giving opinions, understanding a website-describing processes.		

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Unit – III	Reading	6
Reading – Reading Novel/ Auto-biography/ Award winning novels/ Self motivation books/ Basic economics books.		
Unit – IV	Reading	6
Reading- longer texts- close reading, Reading exercise: IELTS & TOEFL, BEC, Journals, Newspapers, Reading edition, Comprehension-reading longer texts- reading different types of texts- magazines.		
Unit – V	Writing	6
Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing. Fill in the blanks: Proposal, Resume writing, PPT, AI tools, Letter writing, informal or personal letters-e-mails-conventions of personal email. Using Chat GPT & Language tools, screening of English movies.		
Total : 30 Hours		

Text Books

1. Anna University, Division of Humanities and Social Sciences, *English for Engineers and Technologists. Vol. 1: A Skills Approach*, Orient Longman, 2002.
2. Trimble Louis, *English for Science and Technology, Vol. 1: A Discourse Approach*. England: Cambridge University Press, 2023.
3. Kumar, Sanjay & Lata, Pushp. *Communication Skills*, Oxford University Press, 2011.

Reference Books

1. C.Richards Jack. *Interchange Fifth Edition*, Cambridge University Press, 2017.
2. Wallwork Adrian, Springer. *English for Academic Correspondence and Socializing*, Cambridge University Press. 2011.

Additional / Web References

1. <https://nptel.ac.in/courses/109106094>
2. nptel.ac.in/courses/109/104/109104090/
3. <http://www.uefap.com/grammar/gramfram.html>


CHAIRMAN-BOARD OF STUDIES

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
Cos	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	-	-	-	-	2	-	-	-	2	3	-	3			
CO 2	-	-	-	-	2	-	-	-	2	3	-	3			
CO 3	-	-	-	-	2	-	-	-	2	3	-	3			
CO 4	-	-	-	-	2	-	-	-	2	3	-	3			
CO 5	-	-	-	-	2	-	-	-	2	3	-	3			
Average	-	-	-	-	2	-	-	-	2	3	-	3			

"3" – High

"2" – Medium

"1" – low

"-“ - No Correlation

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
		Total		60	40

23MC801 INDUCTION PROGRAMME

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over. The induction programme has been introduced by AICTE with the following objective:

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

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

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

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

i. Physical Activity

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

ii. Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, grow into engineering design later.

iii. Universal Human Values

This is the anchoring activity of the Induction Programme. It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting stay in the hostel and department, be sensitive to others, etc. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not

be through do's and dont's, but get students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing.

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

iv. Literary Activity

Literary activity would encompass reading, writing and possibly, debating, enacting a play etc.

v. Proficiency Modules

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

vi. Lectures by Eminent People


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

vii. Visits to Local Area

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

viii. Familiarization to Dept./Branch & Innovations

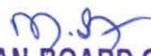
They should be told about what getting into a branch or department means what role it plays in society, through its technology. They should also be shown the laboratories, workshops & other facilities.

ix. Department Specific Activities

About a week can be spent in introducing activities (games, quizzes, social interactions, small experiments, design thinking etc.) that are relevant to the particular branch of Engineering

/Technology/Architecture that can serve as a motivation and kindle interest in building things (become a maker) in that particular field. This can be conducted in the form of a workshop. For example, CSE and IT students may be introduced to activities that kindle computational thinking, and get them to build simple games. ECE students may be introduced to building simple circuits as an extension of their knowledge in Science, and so on. Students may be asked to build stuff using their knowledge of science.

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


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23MA202	ENGINEERING MATHEMATICS-II (Common to all B.E/ B.Tech Programmes)	L	T	P	C
		3	1	0	4
Category	Basic Sciences (BS)				
Pre requisites	23MA201				

Course Objectives

The course is intended to

- Demonstrate the basic concepts of PDE for solving standard partial differential equations.
- Interpreting techniques of vector calculus to solve problems in integration over a curve.
- Familiarize the concepts of complex integration to solve contour problems.
- Introduce Fourier series analysis which is central to many applications in Engineering apart from its use in solving boundary value problems.
- Acquaint the student with Fourier transform techniques used in wide variety of situations.

Course Outcomes (COs)

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

CO. No	Course Outcome	Bloom's Level
CO 1	Demonstrate the formation of PDE to solve homogeneous and non-homogeneous problems.	Understand
CO 2	Acquire knowledge vector calculus to evaluate integration over a curve.	Apply
CO 3	Construct Cauchy integral theorem and residue theorem to evaluate contour integration.	Apply
CO 4	Utilize the fourier series of periodic functions and solve differential equations using fourier analysis.	Apply
CO 5	Contrast mathematical principles on transforms of periodic and non-periodic functions.	Understand

Course Contents

Unit – I	Partial Differential Equations	9+3
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Formation of partial differential equations - Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Homogenous Linear partial differential equations of second and higher order with constant coefficients.

Unit – II	Vector calculus	9+3
Gradient and directional derivative - Divergence and curl - Irrotational and solenoidal vector fields - Line integral over a plane curve - Surface integral and volume integral - Green's, Gauss divergence and Stokes' theorems (proofs excluded).		
Unit – III	Complex Integration	9+3
Line integral - Cauchy's theorem and integral formula -Taylor's and Laurent's series - Singularities - Residues - Residue theorem-Application of residue theorem for evaluation of real integrals - Use of circular contour and semi-circular contour with no pole on real axis.		
Unit – IV	Fourier series	9+3
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range Sine and Cosine series - Parseval's identity – Harmonic Analysis – Complex form of Fourier series.		
Unit – V	Fourier Transform	9+3
Fourier integral theorem - Fourier transform pair - Sine and Cosine transforms - Properties - Transform of elementary functions - Convolution theorem - Parseval's identity.		
Total : 60 Periods		

Text Books

1. Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4th Edition, 2004.
2. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, New Delhi, 2011.
3. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd., 2011.

Reference Books

1. Kolman. B. Hill. D.R., "Introductory Linear Algebra", Pearson Education, New Delhi, First Reprint, 2009.
2. Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private

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Ltd., 2011.

3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2012.

Additional / Web References

1.<https://nptel.ac.in/courses/111106094>

2.<https://archive.nptel.ac.in/courses/111/103/111103070/>

3.<https://nptel.ac.in/courses/111106111>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

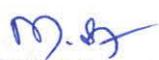
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	1	2	3	4	5	6	7	8	9	10	11	12
CO 2	3	2							1	1		
CO 3	3	2							1	1		
CO 4	3	2							1	1		
CO 5	3	2							1	1		
Average	3	2							1	1		

"3" – High

"2" – Medium

"1" – low

"-" - No Correlation


MINUTE BOOK
CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023

Approved in Academic Council Meeting on 07.11.2023

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)				16		
Total				40	60	

23EC301	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to all B.E/ B.Tech. Programmes)	L	T	P	C
		3	0	0	3
Category	Engineering Sciences				
Pre requisites	Nil				

Course Objectives

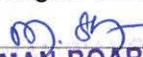
The course is intended to

- Solve electric circuits using basic laws.
- Impart knowledge of types, construction and working principles of transformer and concepts of protective devices.
- Familiarize the types, construction and working principles of electrical machines.
- Introduce the characteristics and applications of analog devices and logic gates.
- Acquaint the functional elements and working of measuring instruments.

Course Outcomes

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

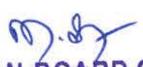
CO. No.	Course Outcome	Bloom's Level
CO 1	Compute the electric circuit parameters using basic laws.	Apply
CO 2	Explain the construction and working of transformers and the concepts of protective devices.	Understand

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CO 3	Explain the construction and working principles of Electrical Machines.	Understand
CO 4	Interpret the characteristics of analog electronic devices and logic gates	Apply
CO 5	Select appropriate measuring instruments for the given application.	Apply

Course Contents

Unit – I	ELECTRICAL CIRCUITS	9
DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with independent sources only		
Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor, Steady state analysis of RLC circuits		
Unit – II	TRANSFORMERS AND ELECTRICAL INSTALLATIONS	9
Transformer: Single Phase Transformer: Construction, principle of operation, EMF Equation, types of transformer, Regulation, Efficiency and applications of Transformer, Three phase transformer. Types of wires and cables, earthing, protective devices - switch fuse unit - Miniature circuit breaker - moulded case circuit breaker - earth leakage circuit breaker, safety precautions and First Aid.		
Unit – III	ELECTRICAL MACHINES	9
Construction of electrical machine, Working principle of Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction and working principle of alternator, Single phase Induction Motor, three phase induction motor.		
Unit – IV	ANALOG AND DIGITAL ELECTRONICS	9
Analog electronics: Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon, Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications, Transistors: IV characteristics of BJT, FET, IGBT, UJT, Applications Digital electronics: Number Systems - Code Converters: BCD, Gray Code, Excess 3 – 1's complement, 2's complement - Logic Gates.		
Unit – V	MEASUREMENTS AND INSTRUMENTATION	9
Functional elements of an instrument, Operating Principle, types –Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Standards and calibration, Instrument Transformers-CT and PT, DSO- Block diagram- Data acquisition.		
Total : 45 Hours		


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Text Books

1. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2011.
2. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", McGraw Hill Education, Second Edition, 2020
3. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, 2014.
4. James A Svoboda, Richard C. Dorf, Introduction to Electric Circuits, Wiley, 2018

Reference Books

1. Muthusubramanian, R. Basic Electrical & Electronics Engineering, Tata McGraw Hill Education Private Limited, 2009.
2. Thomas L. Floyd, 'Electronic Devices', Pearson Education, Tenth Edition, 2017.
3. Thomas L. Floyd, 'Digital Fundamentals', Pearson Education, Eleventh Edition, 2018.
4. H.S. Kalsi, 'Electronic Instrumentation', McGraw-Hill education, New Delhi, 2018

Additional / Web References

1. <https://archive.nptel.ac.in/courses/117/106/117106108/>
2. [https://nptel.ac.in/courses/108105132/](https://nptel.ac.in/courses/108/105/108105132/)
3. <https://nptel.ac.in/courses/108105153>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

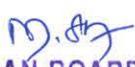
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2	-	-	-	-	-	-	-	2	2			
CO 2	3	2	2	-	-	-	-	-	-	-	1	2			
CO 3	3	2	2	-	-	-	-	-	-	-	2	2			
CO 4	3	2	2	-	-	-	-	-	-	-	2	2			
CO 5	3	1	1	-	-	-	-	-	-	-	2	2			
Average	3	1.8	1.8	-	-	-	-	-	-	-	1.8	2			

3 – High

2 – Medium

1 – Low

'-' - No Correlation



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Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)				16		
				Total	40	60

23ME301	ENGINEERING GRAPHICS	L	T	P	C
		3	1	0	4
Category	Engineering Sciences				
Pre requisites	NIL				

Course Objectives

The course is intended to

- Develop graphical skills for the construction of curves
- Expose the orthographic principles through lines and planes.
- Demonstrate the concepts of orthographic projections of solids
- Impart the knowledge on sectioning solids and development of lateral surfaces of solids
- Exposure to the significance of isometric projections

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Sketch the engineering curves as per engineering drawing standards	Understand
CO 2	Illustrate the orthographic projections to construct lines and planar surface	Understand
CO 3	Construct the orthographic views of solids	Apply
CO 4	Develop the lateral surfaces of solids using drawing standards	Apply
CO 5	Sketch the isometric projection and perspective projection of simple solids	Apply

Course Contents

Unit – I	Plane Curves	12
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Importance of graphics in engineering applications – Use of drafting instruments – Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

Unit – II	Projection of Lines and Plane Surface	12
Orthographic projection-Principal planes-First angle projection-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. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.		
Unit – III	Projection of Solids	12
Projection of solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.		
Unit – IV	Projection of Sectioned Solids and Development of Surfaces	12
Sectioning of prisms, pyramids, cylinder, and cone in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other - obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids - Prisms, pyramids cylinders and cones.		
Unit – V	Isometric Projection	12
Principles of isometric projection — isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)		
Total : 60 Hours		

Text Books

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natarajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

Reference Books



CHAIRMAN-BOARD OF STUDIES

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27th Edition, 2017.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015
4. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.

Additional / Web References

1. <https://nptel.ac.in/courses/112103019>
2. https://en.wikipedia.org/wiki/Engineering_drawing

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 2	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 3	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 4	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
CO 5	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-
Average	3	2	2	-	-	-	-	-	-	3	-	2	3	3	-

3 – High

2 – Medium

1 – low

“ - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (8 marks during CIA I and 8 marks during CIA II)			16			
			Total		40	60

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23CS401	Data Structures and Algorithms (Common to CSE, IT, AI & DS & Cyber Security)	L	T	P	C
		3	0	0	3
Category	Engineering Science				
Pre requisites	Nil				

Course Objectives

The Course will enable learners to:

- To understand the concepts of List ADT.
- To learn linear data structures – stacks and queues ADTs.
- To understand and apply Tree data structures
- To understand and apply Graph structures.
- To analyze sorting, searching and hashing algorithms.

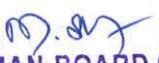
Course Outcomes (COs)

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

CO. No	Course Outcome	Bloom's Level
CO 1	Implement abstract data types for lists.	Apply
CO 2	Solve real world problems using appropriate linear data structures	Apply
CO 3	Apply appropriate tree data structures in problem solving	Apply
CO 4	Implement appropriate Graph representations & solve real-world applications	Apply
CO 5	Implement various searching and sorting algorithms.	Apply

Course Contents

Unit – I	LINEAR DATA STRUCTURES – LIST	9
Algorithm analysis - running time calculations - Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists - circularly linked lists - doubly-linked lists – applications of lists – Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).		
Unit – II	LINEAR DATA STRUCTURES – STACKS, QUEUES	9


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Stack ADT – Stack Model - Implementations: Array and Linked list - Applications - Balancing symbols - Evaluating arithmetic expressions - Conversion of Infix to postfix expression - Queue ADT – Queue Model - Implementations: Array and Linked list - applications of queues - Priority Queues – Binary Heap – Applications of Priority Queues.

Unit – III	NON LINEAR DATA STRUCTURES – TREES	9
Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT– AVL Tree.		
Unit – IV	NON LINEAR DATA STRUCTURES - GRAPHS	9
Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Applications of graphs – BiConnectivity – Euler circuits.		
Unit – V	SEARCHING, SORTING AND HASHING TECHNIQUES	9
Searching- Linear Search - Binary Search - Sorting - Bubble sort - Selection sort - Insertion sort – Hashing - Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing		
Total : 45 Periods		

Text Books

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 4th Edition, Pearson Education, 2014.
2. Sartaj Sahni, "Data Structures, Algorithms and Applications in C++", Silicon paper publications, 2004.

Reference Books

1. Jean-Paul Tremblay and Paul Sorenson, "An Introduction to Data Structures with Application", McGraw-Hill, 2017.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in Java", Third Edition, Pearson Education, 2012.
3. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008.
4. Ellis Horowitz, Sartaj Sahni, Dinesh P Mehta, "Fundamentals of Data Structures in C++", Second Edition, Silicon Press, 2007.

Additional / Web References

https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01350157816505139210584/overview


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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	3	3	3	2	-	-	-	-	-	2	2
CO 2	3	3	3	3	2	-	-	-	-	-	2	2
CO 3	3	3	3	3	2	-	-	-	-	-	2	2
CO 4	2	2	-	2	2	-	-	-	-	-	2	2
CO 5	3	2	-	-	2	-	-	-	-	-	2	2
Average	2	3	3	3	2	-	-	-	-	-	2	2

3 – High

2 – Medium

1 – Low

'-' - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*	
CIA I	3 hours	2.5 units	100	12	24	60	
CIA II	3 hours	2.5 units	100	12			
Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc.,			16				
(8 marks during CIA I and 8 marks during CIA II)							
			Total	40		60	


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தமிழ்நுட்பமும்

23TA102

L T P C

1001

அலகு 1 நெசவு மற்றும் பானைத் தொழில்நுட்பம்:

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

அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் மற்றும் சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான 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 கட்டிடக்கலை.

அலகு 3 உற்பத்தித் தொழில்நுட்பம்:

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எ.கு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சிட்டதல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மனிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு 4 வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்:

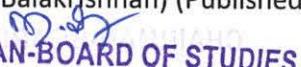
அனை, ஏரி, குளங்கள், மதகு - சோழர்காலக் குழுழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.

அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநால் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr. K.K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr. S.V. Subatamanian, Dr. K.D. Thirunavukkarasu), (Published by: International Institute of Tamil Studies)
8. The Contributions of Tamils of 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, Tamilnadu).
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, Tamilnadu).
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by RMRL) – Reference Book.


CHAIRMAN-BOARD OF STUDIES

TAMILS AND TECHNOLOGY

23TA102

LTPC 1001

UNIT I WEAVING AND CERAMIC TECHNOLOGY

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY

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

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

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

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.

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 சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr. K.K. Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils – The Classical Period (Dr. S. Singaravelu) (Published by: International Institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr. S.V. Subatamanian, Dr. K.D. Thirunavukkarasu), (Published by: International Institute of Tamil Studies)
8. The Contributions of Tamils of 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, Tamilnadu).
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, Tamilnadu).
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by RMRL) – Reference Book.


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23IT301	PROGRAMMING IN C (Common for all programmes)	L	T	P	C
		3	0	2	4
Category	Engineering Science				
Pre requisites	Nil				

Course Objectives

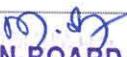
The course is intended to

1. Illustrate the constructs of C Language.
2. Summarize C programs using arrays and strings.
3. Implement modular applications in C using functions.
4. execute applications in C using pointers and structures.
5. Examine the input/output and file handling in C.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
	Theory	
CO 1	Summarize the fundamentals of C Programming constructs.	Understand
CO 2	Illustrate the applications using arrays and strings.	Understand
CO 3	Integrate the modular applications in C using functions.	Apply
CO 4	Execute the applications in C using structures and pointers.	Apply
CO 5	Prepare the applications using sequential and random access file processing.	Apply
	Laboratory	
CO 6	Execute the knowledge on C programming constructs.	Apply


CHAIRMAN-BOARD OF STUDIES

CO 7	Experiment the programs in C using arrays and strings.	Apply
CO 8	Choose the applications in C using functions.	Apply
CO 9	Examine the applications in C using structures and pointers.	Apply
CO 10	Prepare the applications in C using file processing.	Apply

Course Contents		
Unit – I	Basics of C Programming	9
Introduction to programming paradigms – Applications of C Language - Structure of C program - C programming: Data Types - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements – Decision making statements - Switch statement - Looping statements		
Unit – II	Arrays and Strings	9
Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays - String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.		
Unit – III	Functions and Pointers	9
Modular programming - Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions –Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference.		
Unit – IV	Structures and Union	9
Structure - Nested structures – Pointer and Structures – Array of structures – Self-referential structures – Dynamic memory allocation - Singly linked list – typedef – Union - Storage classes and Visibility.		
Unit – V	File Processing	9
Files – Types of file processing: Sequential access, Random access – Sequential access file - Random access file - Command line arguments.		
Total : 45 Periods		


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List of Exercises

S.No.	Name of the Exercise	CO	Bloom's Level
1	I/O statements, operators, expressions	CO 6	Apply
2	decision-making constructs: if-else, go to, switch-case, break-continue	CO 6	Apply
3	Loops: for, while, do-while	CO 6	Apply
4	Arrays: 1D and 2D, multi-dimensional arrays, traversal	CO 7	Apply
5	Strings: operations	CO 7	Apply
6	Functions: call, return, passing parameters by (value, reference), passing arrays to function.	CO 8	Apply
7	Recursion	CO 8	Apply
8	Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers	CO 9	Apply
9	Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.	CO 9	Apply
10	Files: reading and writing, File pointers, file operations, random access, processor directives.	CO 10	Apply

Text Books

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Pearson Education, Second Edition, 2015.

Reference Books

1. Paul Deitel and Harvey Deitel, "C How to Program: with an Introduction to C++", Pearson Education, Eighth edition, 2018.
2. Yashwant Kanetkar, Let us C, BPB Publications, 17th Edition, 2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.

CHIEF OF STUDIES
CHAIRMAN-BOARD OF STUDIES

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| 4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, Second Edition, 2013. |
| 5. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Pearson Education, 1st Edition, 2013. |

Additional / Web References

- | |
|--|
| 1. https://nptel.ac.in/courses/106104128 |
| 2. https://www.coursera.org/specializations/c-programming |
| 3. https://www.udemy.com/course/c-programming-for-beginners-/ |

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2	-	3	-	-	-	2	-	-	2	-	-	-
CO 2	3	2	2	-	3	-	-	-	2	-	-	3	-	-	-
CO 3	3	3	2	-	3	-	-	-	2	-	-	2	-	-	-
CO 4	3	2	2	-	3	-	-	-	2	-	-	3	-	-	-
CO 5	3	2	3	-	3	-	-	-	2	-	-	2	-	-	-
CO 6	3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
CO 7	3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
CO 8	3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
CO 9	3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
CO 10	3	2	2	3	-	-	-	-	-	-	-	3	-	-	-
Average	3	2.1	2. 1	3	3	2	-	-	2	-	-	2.7	-	-	-

3 – High

2 – Medium

1 – Low

“ - No Correlation



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Assessment	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
Theory Component						
CIA I	3 hours	2.5 units	100	10	20	50
CIA II	3 hours	2.5 units	100	10		
Practical Component						
Observation & Analysis of Experimental results, Viva Voce, Quiz based on rubrics.		All Experiments	75	22.5	30	-
Model Exam	3 hours		25	7.5		
Total					50	50

23ME302	ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	4	2
Category	Engineering Sciences				
Pre requisites	Nil				

Course Objectives
The course is intended to
<ul style="list-style-type: none"> Understand the basic carpentry, plumbing, sheet metal and welding operations. Understand various wiring circuits and soldering & checking of continuity.

Course Outcomes		
On successful completion of the course, students will be able to		
CO. No.	Course Outcome	Bloom's Level
CO 1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work	Understand
CO 2	Make joints in wood materials used in common household wood work	Apply

CO 3	Weld various joints in steel plates using arc welding work and use sheet metal practices in fabrication	Apply
CO 4	Wire various electrical joints in common household electrical wiring	Apply
CO 5	Solder and test simple electronic circuits; Assemble and dismantle computer	Apply

S.No	List of Exercises	CO	Blooms Taxonomy
GROUP-A (CIVIL & MECHANICAL)			
1.	Assemble the pipeline connections using tools for the given layout	CO 1	Apply
2.	Making wooden T- Joint, and lap joint using carpentry tools	CO 1	Apply
3.	Basic machining work- simple turning and facing	CO 2	Apply
4.	Welding a butt and lap joint using welding process	CO 3	Apply
5.	Make a tray in sheet metal for the given dimensions	CO 3	Apply
GROUP-B (ELECTRICAL & ELECTRONICS)			
6.	Stair case wiring	CO 4	Apply
7.	Fluorescent lamp wiring	CO4	Apply
8.	Energy meter wiring	CO4	Apply
9.	Soldering simple electronic circuits and check the continuity	CO 5	Apply
10.	Assembly and dismantle of computer/ laptop/Mobile phones	CO 5	Apply
Total : 60 Periods			

Reference Books

1. Manual-prepared by SSCET

Web References

1. <https://be-iitkgp.vlabs.ac.in/exp/familiarisation-resistor/>
2. <https://fab-coep.vlabs.ac.in/exp/computer-controlled-cutting/>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)		
CO	POs	PSOs
		10/10 CHAIRMAN-BOARD OF STUDIES

	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 2	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 3	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 4	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
CO 5	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-
Average	3	2	2	2	1	-	-	-	3	2	-	-	3	2	-

3 – High

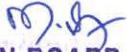
2 – Medium

1 – low

'-' - No Correlation

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination				
Total				60	40

23CS402	Data Structures and Algorithms Laboratory (Common to CSE, IT, AI & DS, Cyber Security)	L	T	P	C
		0	0	3	1.5
Category	Engineering Science				
Pre requisites	Nil				


CHAIRMAN-BOARD OF STUDIES

Passed in Board of studies Meeting on 26.10.2023

Approved in Academic Council Meeting on 07.11.2023

Course Objectives

The course is intended to

1. design linear data structures – lists
2. design linear data structures – stacks, and queues
3. understand sorting, searching and hashing algorithms
4. apply Tree structures
5. apply Graph structures.

Course Outcomes (COs)

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

CO. No	Course Outcome	Bloom's Level
CO 1	implement linear data structures.	Apply
CO 2	implement Stack and Queue ADT operations.	Apply
CO 3	Analyze the efficiency of different searching and sorting algorithms	Apply
CO 4	Use tree ADT for searching applications.	Apply
CO 5	Apply appropriate graph algorithms for shortest path applications.	Apply

S.No	Exercise	CO	Bloom's Level
1.	Write a program that uses functions to perform the following operations on singly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal	1	Apply
2.	Write a program that uses functions to perform the following operations on doubly linked list i) Creation ii) Insertion iii) Deletion iv) Traversal.	1	Apply
3.	Write a program that uses functions to perform the following operations on circular linked List i) Creation ii) Insertion iii) Deletion iv) Traversal.	1	Apply

M.S
CHAIRMAN-BOARD OF STUDIES

4.	Write a program that implements stack (its operations) using i) Arrays ii) Linked list(Pointers).	2	Apply
5.	Write a program that implements Queue (its operations) using i) Arrays ii) Linked list(Pointers).	2	Apply
6.	Write a program that uses both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers: a) Linear search b) Binary search	3	Apply
7.	Write a program that implements the following sorting i) Bubble sort ii) Selection sort iii)Quick sort..	3	Apply
8.	Write a program that implements the following i) Insertion sort ii) Merge sort iii)Heap sort.	3	Apply
9.	Write a program to perform the following operations: a) Insert an element into a binary search tree. b) Delete an element from a binary search tree. c) Search for a key element in a binary search tree.	4	Apply
10.	Write a program to implement the tree traversal methods.	4	Apply
11.	Write a program to perform the following operations: a) Insert an element into an AVL tree. b) Delete an element from an AVL tree. c) Search for a key element in a AVL tree	4	Apply
12.	Write a program to perform DFS and BFS of Graph using Graph ADT.	5	Apply
13	Write a program to find the shortest path using Graph ADT using graph algorithms	5	Apply

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12

10.11.2023
CHAIRMAN-BOARD OF STUDIES

CO 1	3	3	3	3	2	-	-	-	-	-	2	2
CO 2	3	3	3	3	2	-	-	-	-	-	2	2
CO 3	3	3	3	3	2	-	-	-	-	-	2	2
CO 4	2	2	-	2	2	-	-	-	-	-	2	2
CO 5	3	2	-	-	2	-	-	-	-	-	2	2
Average	2	3	3	3	2	-	-	-	-	-	2	2

3 – High

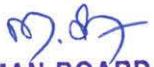
2 – Medium

1 – Low

'-' - No Correlation

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination				
		Total	60	40	




CHAIRMAN-BOARD OF STUDIES

23MA203	DISCRETE MATHEMATICS (Common to AI&DS, CSE,CSE(CS) & IT)	L	T	P	C
		3	1	0	4
Category	Basic Science (BS)				
Pre requisites	Engineering Mathematics-II				

Course Objectives

The course is intended to make the students to

1. Extend student's logical and mathematical maturity and ability to deal with abstraction.
2. Introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
3. Understand the basic concepts of combinatorics and graph theory.
4. Familiarize the applications of algebraic structures.
5. Understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Use the fundamental concept of logic & proofs to develop mathematical arguments using logical connectives and quantifiers.	Apply
CO 2	Identify the concepts of basic principles of counting and solve recurrence relations using Generating functions.	Apply
CO 3	Utilize and explore the basics of graph theory.	Apply
CO 4	Solve algebraic structures and apply the operations on sets, binary relations, equivalence relations and partial ordered sets in engineering problems.	Apply
CO 5	Construct the Hasse diagram to understand the concept of lattices and boolean algebra.	Apply

Course Contents

UNIT – I	LOGIC AND PROOFS	9+3
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<p>Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers –Rules of inference - Introduction to proofs – Proof methods and strategy.</p>		
UNIT – II	COMBINATORICS	9+3
<p>Mathematical induction – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.</p>		
UNIT – III	GRAPHS	9+3
<p>Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.</p>		
UNIT – IV	ALGEBRAIC STRUCTURES	9+3
<p>Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.</p>		
UNIT – V	LATTICES AND BOOLEAN ALGEBRA	9+3
<p>Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems– Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra – Sub Boolean Algebra – Boolean Homomorphism.</p>		
Total : 60 Periods		

Text Books

1. Rosen. K.H., "Discrete Mathematics and its Applications", 8th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2021.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

Reference Books

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2019.
2. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2017.

Additional / Web References

1. <https://archive.nptel.ac.in/courses/111/106/111106052/>
2. <https://nptel.ac.in/courses/128106001>

3. <https://nptel.ac.in/courses/106105192>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 2	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 4	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 5	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
Average	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
3 – High			2 – Medium			1 – Low			'-' - No Correlation						

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 Hours	2.5 Units	100	12	24	60
CIA II	3 Hours	2.5 Units	100	12		
Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (marks during CIA I and 8 marks during CIA II)					16	
TOTAL					40	60

23CS403	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3
Category	Professional Core Course				
Pre requisites	Nil				

Course Objectives

The course is intended to make the students to

- Outline the architecture of network layering and application layer protocols
- Familiarize the functions and protocols of the Transport layer
- Learn the functions of network layer and the various routing protocols
- Discover the end to end secure data communication
- Examine the data transmission through physical layer

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Illustrate the architecture and the working of application layer protocols.	Understand
CO 2	Infer the transport flow process from one node to another	Understand
CO 3	Make use of the routing and IP Addressing mechanisms	Apply
CO 4	Discover the data flow process from one node to another	Analyze
CO 5	Contrast analog and digital transmission techniques	Analyze

Course Contents

UNIT – I	INTRODUCTION TO NETWORKS AND APPLICATION LAYER	6
Introduction to Computer Networks - Network Edge and Core Components - Types of Network - Reference Models - TCP/IP Model - ISO/OSI Model - Application Layer Protocols - WWW & HTTP, DNS, ARP & RARP, SMTP, IMAP & POP3, DHCP, P2P		
UNIT – II	TRANSPORT LAYER	9
Introduction - Transport Layer Services - Connection Management - Error and Flow Control - Congestion Control - Congestion Avoidance (DEC bit, RED) - SCTP - Quality of Service.		

UNIT – III	NETWORK LAYER	9
IPv4 Addressing - Subnetting Design - IPv6 - NAT - Routing - Distance Vector Routing - RIP - Link State Routing - OSPF - Path Vector Routing - BGP - Multicast Routing - MOSPF - DVMRP - PIM - Broadcast Routing.		
UNIT – IV	DATALINK LAYER	12
Framing - Error Detection and Correction Techniques - Parity - LRC - CRC - Hamming Code - Flow Control and Error Control - Stop and Wait - ARP - RARP - ARQ - Sliding Window - HDLC - Multiple Access Protocols - CSMA - CSMA/CD - CSMA/CA - VLAN - WLAN (IEEE 802.11) - Ethernet (IEEE 802.3).		
UNIT – V	PHYSICAL LAYER	9
Analog Data Transmission Techniques - Digital Data Transmission Techniques - Switching Techniques - Transmission Media Types - Multiplexing and Spread Spectrum.		
Total : 45 Periods		

Text Books

1. Kurose, James F., Ross, Keith W., "Computer Networking: A Top-down Approach", Pearson, 2021.
2. Forouzan, Behrouz A, "Data Communications and Networking with TCP/IP Protocol Suite", McGraw Hill, 2021.
3. Tanenbaum, Andrew S, "Computer Networks", Global Edition. Pearson Education, 2021.

Reference Books

1. Peterson, Larry L., and Davie, Bruce S. "Computer Networks: A Systems Approach", United Kingdom, Elsevier Science, 2021.
2. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2013.

Additional / Web References

1. https://onlinecourses.nptel.ac.in/noc22_cs19/preview
2. <https://archive.nptel.ac.in/courses/106/105/106105081/>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1		2								2	2	2	2	2	

CO 2		1			3				2	2	2	2	2	
CO 3		2		2	3				2	2	2	2	2	
CO 4		2			3				2	2	2	2	2	
CO 5		2	2						2	2	2	2	2	
Average		2	2	2	3				2	2	2	2	2	
3 – High			2 – Medium			1 – Low			‘-’ - No Correlation					

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 Hours	2.5 Units	100	12	24	60
CIA II	3 Hours	2.5 Units	100	12		
Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (marks during CIA I and 8 marks during CIA II)				16		
				TOTAL	40	60

23CS404	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3
Category	Professional Core Course				
Pre requisites	Nil				

Course Objectives

The course is intended to make the students to

- Understand the basics and functions of operating systems.
- Apply the scheduling algorithms and analyze the process synchronization.
- Interpret various memory management and I/O management schemes.
- Be familiar with the file system design and storage.
- Be familiar with the basics of virtual machines.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Infer the basic structure and architectural components of the operating system and interpret how application programs interact with the operating system through APIs.	Understand
CO 2	Examine the various scheduling algorithms and synchronization techniques to achieve better performance of a computer system.	Apply
CO 3	Apply the memory allocation and reallocation mechanisms involved in memory management for a specific system	Apply
CO 4	Examine the various file handling strategies to manage files on a secondary storage structure and in a distributed environment.	Apply
CO 5	Identify the virtualization technologies and their types to simulate hardware functionality and create a virtual computer system.	Apply

Course Contents

UNIT – I	INTRODUCTION TO OPERATING SYSTEMS	9
Basic Operating System Concepts-Operating System Structure and Components-Operating System Services and Interfaces-Role of the Kernel and User Space-System calls and System Programs-Open Source and Closed source operating systems		

UNIT – II	PROCESS MANAGEMENT	9
Processes and Threads-Process Scheduling and CPU Scheduling Algorithms-Process Synchronization and Concurrency Control-Deadlocks and Handling Strategies- Deadlock Prevention and Avoidance – Deadlock Detection – Recovery from Deadlock. Inter-Process Communication (IPC)- Multi-Core and Multi-Processor Management.		
UNIT – III	MEMORY MANAGEMENT & I/O MANAGEMENT	9
Memory Management and Virtual Memory - Logical versus Physical Address Space - Swapping Allocation - Page Replacement Algorithm - Allocation of Frames - Thrashing - File Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management – Protection		
UNIT – IV	FILE SYSTEM DESIGN AND STORAGE	9
File System Structures-Storage Technologies-SSD and Flash Storage Optimization - Copy-on Write (CoW) - File Systems-File System Journaling-Distributed File Systems and Cloud Storage File System Monitoring and Analytics.		
UNIT – V	VIRTUALIZATION AND RECENT DEVELOPMENTS	9
Virtualization Principles and Types (Hardware, Software, Network, Storage)-Hypervisors and Virtual Machine Monitors-Microkernels and Exokernels-Security and Integrity in Virtualized Environments - Security in Operating Systems.		
Total : 45 Periods		

Text Books

1. Silberschatz, Abraham, et al. "Operating System Concepts." United Kingdom, Wiley, 2021.
2. Tanenbaum, Andrew S., Bos, Herbert. "Modern Operating Systems". United States, Pearson, 2022.
3. Stallings, William. "Operating Systems: Internals and Design Principles." Singapore Pearson Education South Asia Pvt. Limited, 2020

Reference Books

1. Harvey M. DeitelM, "Operating Systems", Pearson Education Pvt. Ltd, 2007.

Additional / Web References

1. https://onlinecourses.nptel.ac.in/noc21_cs72/preview
2. <https://www.coursera.org/specializations/codio-introduction-operating-systems>
3. <https://www.udemy.com/courses/search/?src=uk b&q=operating+systems>
4. <https://www.redhat.com/en/topics/virtualization>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific

Outcomes (PSOs)																
COs	POs													PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO 1		2								2	2	2	2	2		
CO 2		1			3					2	2	2	2	2		
CO 3		2		2	3					2	2	2	2	2		
CO 4		2			3					2	2	2	2	2		
CO 5		2	2							2	2	2	2	2		
Average		2	2	2	3					2	2	2	2	2		
3– High				2 – Medium				1 – Low				'-' - No Correlation				

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 Hours	2.5 Units	100	12	24	60
CIA II	3 Hours	2.5 Units	100	12		
Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc.,					16	
(marks during CIA I and 8 marks during CIA II)						
TOTAL					40	60

23IT402	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3
Category	Professional Core Course				
Pre requisites	Nil				

Course Objectives

The course is intended to make the students to

- Learn the fundamentals of data models, relational algebra and SQL
- Represent a database system using ER diagrams and to learn normalization techniques
- Understand the fundamental concepts of transaction, concurrency and recovery processing
- Understand the internal storage structures using different file and indexing techniques
- Have an introductory knowledge about the Distributed databases, NOSQL and database security

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Understand the data models and the types of data used in databases.	Understand
CO 2	Select queries for creating databases & performing the relational operations.	Apply
CO 3	Develop the normalization in relational databases for removing anomalies.	Apply
CO 4	Discover the basic transaction, concurrency issues, deadlock and its recovery	Analyze
CO 5	Discover the performance of NoSQL and New SQL databases	Analyze

Course Contents

UNIT – I	INTRODUCTION TO DATABASES	10
Understanding Data and Information - Database Vs DBMS – DBA Vs DBE-Modern Databases - DBMS Architecture and Components - Data Models - Relational Model - Codd's 12 Rules - Object-Relational Mapping (ORM) - SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL		
UNIT – II	DATABASE DESIGN	8
Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency		

Preservation – Boyce Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT – III	REPLICATION PROCESS AND DR PROCESS	9
Introduction to DBMS - Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control – Two Phase Locking-Timestamp – Multisession – Validation and Snapshot isolation– Multiple Granularity locking – Deadlock Handling – Recovery Concepts – Recovery based on deferred and immediate update – Shadow paging – ARIES Algorithm- System Software - PC installation and troubleshooting - Client OS		
UNIT – IV	IMPLEMENTATION TECHNIQUES	9
RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing – Graph Indexing Tool – Disadvantages of Indexing Tool -Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations – Query optimization using Heuristics - Cost Estimation		
UNIT – V	DISTRIBUTED DATABASES	9
Distributed Databases: Architecture, Data Storage, Transaction Processing, and Query processing and optimization – NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases. Database Security: Security issues – Access control based on privileges – Role Based access control – SQL Injection – Statistical Database security		
Total : 45 Periods		

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Seventh Edition, McGraw Hill, 2020.
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Seventh Edition, Pearson Education, 2017
3. Peter Rob and Corlos Coronel, Database System, Design, Implementation and Management, Thompson Learning Course Technology, Ninth edition, 2011

Reference Books

2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

Additional / Web References

1. https://onlinecourses.nptel.ac.in/noc22_cs91/preview
2. <https://www.coursera.org/learn/database-management>
3. <https://www.udemy.com/course/database-management>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1		2								2	2	2	2	2	
CO 2		1			3					2	2	2	2	2	
CO 3		2		2	3					2	2	2	2	2	
CO 4		2			3					2	2	2	2	2	
CO 5		2	2							2	2	2	2	2	
Average		2	2	2	3					2	2	2	2	2	
3– High			2 – Medium			1 – Low			'-' - No Correlation						

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*	
CIA I	3 Hours	2.5 Units	100	12	24	60	
CIA II	3 Hours	2.5 Units	100	12			
Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc.,					16		
(marks during CIA I and 8 marks during CIA II)							
TOTAL					40	60	

23EC304	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION	L	T	P	C
		3	0	2	4
Category	Engineering Science				
Pre requisites	Nil				

Course Objectives

The course is intended to

- Design and analyze various combinational digital circuits using logic gates.
- Design and analyze various sequential digital circuits using logic gates.
- Understand the basic structure and operation of a digital computer.
- Study the design of processor and to familiarize with the hazards.
- Study the concept of I/O devices and standard I/O interfaces.

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO 1	Demonstrate combinational circuits using logic gates to perform logical operations	K2
CO 2	Illustrate synchronous sequential circuits using flip-flops, registers and counters	K2
CO 3	Illustrate the fundamentals of computer systems and its architecture	K2
CO 4	Identify the different types of control design to measure hazards	K2
CO 5	Identify the characteristics of various memory systems and I/O communication	K3

Course Contents

UNIT – I	COMBINATIONAL LOGIC DESIGN	9
Review of Boolean algebra – Parallel binary adder and subtractor – Carry look ahead adder – BCD adder – Multiplexer – Demultiplexer – Decoder – Encoder – Parity checker and generator – Code converters – Magnitude comparator.		
UNIT – II	SYNCHRONOUS SEQUENTIAL CIRCUITS	9
Introduction to Sequential Circuits - Flip-flops - Operation and excitation tables, Triggering of Flip- flop - Design and analysis of clocked sequential circuits – Design - Moore/ Mealy models - state reduction techniques - Registers – Counters.		
UNIT – III	COMPUTER FUNDAMENTALS	9
Basic Functional units of Computers – Functional units, basic Operational concepts, Bus structures, Software Performance - Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction - Instruction Set Architecture (ISA) – Addressing Modes.		

UNIT – IV	PARALLEL PROCESSOR AND PIPELINING	9
Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining and Vector Processing: Basic concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards.		
UNIT – V	MEMORY AND I/O INTERFACE	9
Memory Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Performance considerations - Virtual Memory – DMA – I/O Interface – Accessing I/O – Parallel and Serial Interface – Interrupt I/O – Interconnection Standards.		
Total : 45 Hours		

List of Experiments

S.No	Name of the Experiment	CO	Bloom's Level
1	Verify and simulate adder, subtractor & code converters using logic gates.	CO2	Apply
2	Verify and simulate Multiplexer & Demultiplexer using IC 74150 & IC 74154.	CO2	Apply
3	Verify and simulate Encoders and Decoders using logic gates.	CO2	Apply
4	Design and simulation of Magnitude Comparator using IC 7485.	CO2	Apply
5	Design and implementation of flip-flops using basic gates.	CO3	Apply
6	Design and implementation of shift registers in SISO, SIPO, PISO and PIPO modes.	CO3	Apply
7	Simulator based study of computer architecture	CO5	Apply

Total: 30 Hours

Text Books
1. Morris Mano M., "Digital Design", 6th Edition, Pearson Education Pvt. Ltd., New Delhi, 2018
Reference Books
1. Charles H. Roth, "Fundamentals of Logic Design", 6th Edition, Thomson Learning, New Delhi, 2013. 2. Palnitkar Samir, "Verilog HDL: Guide to Digital Design and Synthesis", 2nd Edition, Pearson Education, New Delhi, 2017. 3. Salivahanan S. & Arivazhagan S., "Digital Circuits and Design", 5th Edition, Oxford University Press, New Delhi, 2018.

Additional / Web References

1. https://onlinecourses.nptel.ac.in/noc24_ee52/preview
2. https://onlinecourses.swayam2.ac.in/nou23_ec05/preview
3. https://onlinecourses.nptel.ac.in/noc24_ee17/preview
4. https://onlinecourses.nptel.ac.in/noc23_ee115/preview

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	-	-	-	-	-	-	2	-	-	1	2	1	1
CO 2	3	2	-	-	-	-	-	-	2	-	-	1	2	1	1
CO 3	3	2	-	-	-	-	-	-	2	-	-	1	2	1	1
CO 4	3	2	-	-	-	-	-	-	2	-	-	1	2	1	1
CO 5	3	2	-	-	-	-	-	-	2	-	-	1	2	1	1
Average	3	2	-	-	-	-	-	-	2	-	-	1	2	1	1

3 – High

2 – Medium

1 – Low

'-' - No Correlation

Assessment	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
Theory Component						
CIA I	3 hours	2.5 units	100	10	20	50
CIA II	3 hours	2.5 units	100	10		
Practical Component						
Observation & Analysis of Experimental results, Viva Voce, Quiz based on rubrics.		All Experiments	75	22.5	30	-
Model Exam	3 hours		25	7.5		
Total					50	50

23CS405	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	3	4.5
Category	Professional Core Course				
Pre requisites	Nil				

Course Objectives

The course is intended to make the students to

- Critically analyze the efficiency of alternative algorithmic solutions for the same problem.
- Illustrate algorithmic conquer design techniques.
- Explain dynamic programming and greedy techniques for solving various problems.
- Apply iterative improvement technique to solve optimization problems
- Examine the limitations of algorithmic power and handling it in different problems.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Examine the efficiency of recursive and non-recursive algorithm mathematically	Analyze
CO 2	Examine the efficiency of different algorithmic techniques	Analyze
CO 3	Solve the problems using dynamic programming & greedy techniques.	Apply
CO 4	Examine file handling types on secondary storage in a distributed environment.	Apply
CO 5	Identify the virtualization technologies to simulate hardware functionality.	Apply

Course Contents

UNIT – I	INTRODUCTION	9
Introduction-Analysis framework – Time space tradeoff-Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving –Fundamentals of the Analysis of Algorithmic Efficiency – Asymptotic Notations and their properties. Analysis Framework – Mathematical analysis for Recursive and Non-recursive Algorithms-Analysis of linear search - Empirical analysis - Algorithm visualization		
UNIT – II	BRUTE FORCE AND DIVIDE AND CONQUER	9
Brute Force – String Matching - Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Multiplication of Large Integers and Strassen's		

Matrix Multiplication – Closest-Pair and Convex - Hull Problems. Decrease and Conquer: - Topological Sorting – Transform and Conquer: Presorting – Heaps and Heap Sort.

UNIT – III	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	9
Dynamic programming – Principle of optimality - Coin changing problem – Warshall's and Floyd's algorithms – Optimal Binary Search Trees - Multi stage graph - Knapsack Problem and Memory functions. Greedy Technique – Dijkstra's algorithm - Huffman Trees and codes - 0/1 Knapsack problem.		
UNIT – IV	BACKTRACKING & BRANCH AND BOUND	9
Lower - Bound Arguments - P, NP, NP- Complete and NP Hard Problems. Backtracking – NQueen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Traveling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Traveling Salesman problem – Knapsack problem		
UNIT – V	ITERATIVE METHODS	9
The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs- The Stable marriage Problem. Transform and conquer: Presorting – Gaussian elimination		
Total : 45 Periods		

List of Experiments

S.No	Name of the Experiment	CO	Bloom's Level
1.	Implement recursive and non-recursive algorithms and study the order of growth from $\log 2n$ to $n!$	CO1	Apply
2.	Divide and Conquer - Strassen's Matrix Multiplication	CO1	Apply
3.	Decrease and Conquer - Topological Sorting	CO2	Apply
4.	Transform and Conquer - Heap Sort	CO2	Apply
5.	Dynamic programming - Coin change Problem, Warshall's and Floyd's algorithms, Knapsack Problem	CO3	Apply
6.	Greedy Technique – Dijkstra's algorithm, Huffman Trees and codes	CO3	Apply
7.	Iterative improvement - Simplex Method	CO4	Apply
8.	Backtracking – N Queen problem, Subset Sum Problem	CO4	Apply
9.	Branch and Bound - Assignment problem, Traveling Salesman Problem	CO5	Apply
10.	Implement randomized algorithms for finding the k^{th} smallest number.	CO5	Apply
Total: 30 Periods			

Text Books

- Levitin, Anany, "Introduction to the Design and Analysis of Algorithms", India, Pearson

Education India, 2017.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms / C++", Second Edition, Universities Press, 2019
Reference Books
1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012. 2. S. Sridhar, "Design and Analysis of Algorithms", Oxford university press, 2014. 3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.

Additional / Web References

- https://onlinecourses.nptel.ac.in/noc21_cs72/preview
- <https://www.coursera.org/specializations/codio-introduction-operating-systems>
- <https://www.udemy.com/courses/search/?src=uk b&q=operating+systems>
- <https://www.redhat.com/en/topics/virtualization>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1		2								2	2	2	2	2	
CO 2		1			3					2	2	2	2	2	
CO 3		2		2	3					2	2	2	2	2	
CO 4		2			3					2	2	2	2	2	
CO 5		2	2							2	2	2	2	2	
Average		2	2	2	3					2	2	2	2	2	
3– High			2 – Medium			1 – Low			'-' - No Correlation						

Assessment	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
Theory Component						
CIA I	3 hours	2.5 units	100	10	20	50
CIA II	3 hours	2.5 units	100	10		
Practical Component						

Observation & Analysis of Experimental results, Viva Voce, Quiz based on rubrics.		All Experiments	75	22.5	30	-
Model Exam	3 hours		25	7.5		
Total					50	50

23IT404	DATABASE MANAGEMENT SYSTEMS LABORATORY	L	T	P	C			
		0	0	3	1.5			
Category		Professional Core Course						
Pre requisites		Nil						

Course Objectives
The course is intended to make the students to
<ul style="list-style-type: none"> • Learn and implement important commands in SQL. • Learn the usage of nested and joint queries. • Understand functions, procedures and procedural extensions of databases. • Understand design and implementation of typical database applications. • Be familiar with the use of a front end tool for GUI based application development..

Course Outcomes		
On successful completion of the course, students will be able to		
CO. No	Course Outcome	Bloom's Level
CO 1	Create databases with different types of key constraints.	Apply
CO 2	Construct simple and complex SQL queries using DML and DCL commands	Apply
CO 3	Use advanced features such as stored procedures and triggers	Apply
CO 4	and incorporate in GUI based application development	Apply
CO 5	Create an XML database and validate with meta-data (XML)	Apply

List of Exercises

S.No	Name of the Exercises	CO	Bloom's Level
1.	Create a simple relational database with tables and write SQL queries for basic CRUD operations (Create, Read, Update, and Delete).	CO1	Apply
2.	Create a set of tables, add foreign key constraints and incorporate referential integrity.	CO1	Apply
3.	Query the database tables using different 'where' clause conditions and also implement aggregate functions	CO2	Apply
4.	Query the database tables and explore sub queries and simple join operations	CO2	Apply
5.	Query the database tables and explore natural, equi and outer joins.	CO2	Apply
6.	Write user defined functions and stored procedures in SQL.	CO2	Apply
7.	Execute complex transactions and realize DCL and TCL commands.	CO3	Apply
8.	Write SQL Triggers for insert, delete, and update operations in a database table.	CO3	Apply
9.	Create View and index for database tables with a large number of records.	CO4	Apply
10.	Create an XML database and validate it using XML schema.	CO4	Apply
11.	Develop a simple GUI based database application and incorporate all the above mentioned features	CO5	Apply
12.	Case Study using any of the real life database applications from the following list, a) Inventory Management for a EMart Grocery Shop b) Society Financial Management c) Cop Friendly App – Eseva d) Property Management – eMall e) Star Small and Medium Banking and Finance • Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application. • Apply Normalization rules in designing the tables in scope. • Prepared applicable views, triggers (for auditing purposes, functions for enabling enterprise grade features). • Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer. • Ability to showcase ACID Properties with sample queries with appropriate settings	CO5	Apply

Total: 45 Periods

Reference Books

1. Manual-prepared by SSCET.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific

Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1		2								2	2	2	2	2	
CO 2		1			3					2	2	2	2	2	
CO 3		2		2	3					2	2	2	2	2	
CO 4		2			3					2	2	2	2	2	
CO 5		2	2							2	2	2	2	2	
Average		2	2	2	3					2	2	2	2	2	
3 – High			2 – Medium			1 – Low			'-' - No Correlation						

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
Total				60	40

23HS702	SOFT SKILLS – II (Common to all B.E./B.Tech Programmes)	L	T	P	C					
		1	0	0	1					
Category	EMPLOYABILITY ENHANCEMENT COURSE (EEC)									
Pre requisites	Soft Skills-I									
Course Objectives										
<p>The course is intended to</p> <ol style="list-style-type: none"> 1. help students develop communication skills and self-confidence 2. motivate students to acquire employability skills 3. introduce various interview techniques to students and guide them to tackle interviews 4. motivate students to become effective public speakers and develop leadership qualities in them 5. help students enhance their writing skills 										

Course Outcomes		
On successful completion of the course, students will be able to		
CO. No	Course Outcome	Bloom's Level
CO 1	Express the art of speaking	Understand
CO 2	Interpret body language effectively	Understand
CO 3	Develop optimistic attitude to cope in organisations	Apply
CO 4	Prepare professionally by improving perception	Apply
CO 5	Organise good etiquette and manners	Apply

Course Contents		
UNIT – I	ART OF SPEAKING	3
Emphasizing S in LSRW, Defining communication, special features and importance of communication, types of communication networks, art of public speaking		
UNIT – II	BODY LANGUAGE	3
Paralinguistic features, origin & uses of body language, improving and interpreting body language		
UNIT – III	DEVELOPING POSITIVE ATTITUDE	3
Features and power of attitudes, attitude and behavior, ways of changing attitude in a person, attitude in workplace, positive attitude and its results, overcoming negative attitude		
UNIT – IV	IMPROVING PERCEPTION	3
Factors influencing perception, perceptual process, perception and its application in organisations and group discussion		
UNIT – V	ETIQUETTE AND MANNERS	3
Modern etiquette, benefits and classification of etiquette, importance of good manners, professional manners		
Total : 15 Periods		

Text Books
1. Alex, K., "Soft Skills: Know Yourself and Know the World" New Delhi: S. Chand & Company Ltd., 2011.
2. Butterfield, Jeff., "Soft Skills for Everyone. Delhi", Cengage Learning, 2012.
3. Apps, Judy., "Voice & Speaking Skills for DUMMIES", West Sussex: John Wiley & Sons, Ltd., 2012.
Reference Books
1. Abidi, Aeda and Ritu Chaudhry, "English for Engineers", Cengage Learning India Pvt. Ltd., Delhi, 2010.
2. Manallack, Stephen, "Soft Skills for a Flat World", New Delhi: Tata McGraw Hill Education Pvt. Ltd., 2012.
Additional / Web References
1. https://positivepsychology.com/positive-mindset/
2. https://www.labvanced.com/content/research/blog/2022-12-5-perception-skills-psychology/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	-	-	-	-	2	-	-	-	2	3	-	3	-	-	-
CO 2	-	-	-	-	2	-	-	-	2	3	-	3	-	-	-
CO 3	-	-	-	-	2	-	-	-	2	3	-	3	-	-	-
CO 4	-	-	-	-	2	-	-	-	2	3	-	3	-	-	-
CO 5	-	-	-	-	2	-	-	-	2	3	-	3	-	-	-
Average	-	-	-	-	2	-	-	-	2	3	-	3	-	-	-

3– High 2 – Medium 1 – low “-“ - No Correlation

Continuous Internal Assessment		Total Marks
Individual Assignment / Case Study / Seminar / Mini Project		Written Test 100
50		50

23MA205	PROBABILITY QUEUEING THEORY & STATISTICS	L	T	P	C
	(Common to AI&DS, CSE,CSE(CS) & IT)	3	1	0	4
Category	Basic Science(BS)				
Pre requisites	Engineering Mathematics - I &II				

Course Objectives

The course is intended to make the students to

1. Introduce the basic concepts of probability and one dimensional random variables.
2. Introduce the basic concepts of distribution functions.
3. Introduce the basic concepts of two dimensional random variables.
4. Contrast the significance of advanced queuing models
5. Acquaint the knowledge of testing of hypothesis for small and large samples.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Identify the basic concepts of probability, conditional probability, Baye's theorem and random variables.	Apply
CO 2	Construct the basic concepts of one dimensional random variables and standard distributions.	Apply
CO 3	Solve the concepts of two dimensional random variables and to analyze the relations, transformations of random variables.	Apply
CO 4	Construct the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.	Apply
CO 5	Utilize the concept of testing of hypothesis for small and large samples in real life problems.	Apply

Course Contents

UNIT – I	PROBABILITY AND ONE DIMENSIONAL RANDOM VARIABLES	9+3
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Probability – The axioms of probability – Conditional probability – Baye's theorem - One dimensional random variable: Discrete and continuous random variables – Moments.

UNIT – II	DISTRIBUTIONS	9+3
Discrete distributions - Binomial distribution, Poisson distribution, Geometric distribution. Continuous Distributions - Uniform distribution, Exponential distribution and Normal distribution.		
UNIT – III	TWO - DIMENSIONAL RANDOM VARIABLES	9+3
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression - Transformation of random variables.		
UNIT – IV	QUEUEING MODELS	9+3
Markovian queues – Birth and death processes – Single and multiple server queuing models – Little's formula - Finite source models - M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and M/EK/1 as special cases – Series queues – Open Jackson networks.		
UNIT – V	TESTING OF HYPOTHESIS	9+3
Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.		
Total : 60 Periods		

Text Books

1. Johnson. R.A., Miller. I.R and Freund. J.E, " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2018.
2. Ibe, O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint, 2014.
3. John E. Freund, "Mathematical Statistics", Prentice Hall, 5th Edition, 2013.

Reference Books

1. Hwei Hsu, " Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2017.
2. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 6th Edition, John Wiley and Sons, 2018.
3. Yates, R.D. and Goodman. D. J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012.

Additional / Web References

1. <https://archive.nptel.ac.in/courses/111/104/111104079/>

2. <https://archive.nptel.ac.in/courses/111/103/111103159/>
 3. <https://archive.nptel.ac.in/courses/103/106/103106120/>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 2	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 3	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 4	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
CO 5	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-
Average	3	2	-	-	-	-	-	-	1	1	-	-	-	-	-

3 – High

2 – Medium

1 - Low

'-' - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 Hours	2.5 Units	100	12	24	60
CIA II	3 Hours	2.5 Units	100	12		
Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (marks during CIA I and 8 marks during CIA II)					16	
TOTAL					40	60

23CS406	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	3
Category	Professional Core Course				
Pre requisites	Nil				

Course Objectives

The course is intended to make the students to

- Acquire knowledge on OOPS concepts
- Understand the limitations of inheritance, packages and interfaces
- Develop skills in solving problems of exception handling mechanisms
- Develop the applications using JAVA.
- Learn about event handling and GUI components.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Make use of the concepts of classes and objects to solve simple problems	Apply
CO 2	Develop programs using inheritance, packages and interfaces.	Apply
CO 3	Develop exception handling mechanisms and multithreaded models to solve real world problems.	Apply
CO 4	Develop applications with Input and Output packages, string classes, Collections and generics concepts	Apply
CO 5	Develop the GUI Programming	Apply

Course Contents

UNIT – I	INTRODUCTION TO JAVA	9
An overview of Java - Java Architecture – JVM - Bytecode - Java source file structure – basic programming constructs - Data Types - Variables- Arrays- Operators - Control Statements - Command Line Arguments - Arrays one dimensional and multidimensional.		
UNIT – II	JAVA OBJECT ORIENTED CONCEPTS	9

Defining Classes in Java: Methods, Constructors, Garbage Collection - Access Specifiers Method Overloading – Inheritance: Super keyword, this keyword, Method Overriding, Abstract Classes – Static Members - Final Method and Class – Polymorphism.		
UNIT – III	PACKAGES, EXCEPTION HANDLING & STRINGS	9
Packages – Interfaces - Exceptions – Exception Hierarchy – Throwing and Catching Exceptions – Built-in Exceptions, User defined Exceptions - Strings – Built-in Methods - String Buffer class.		
UNIT – IV	I/O STREAMS AND COLLECTIONS	9
Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files – Collection Interfaces – Collection Classes - List, Map, Set Generics Annotations.		
UNIT – V	MULTITHREADING AND DATABASE	9
Java Threads – life cycle - Multithreading: Thread Creation, Thread Synchronization- Inter Thread Communication - GUI programming, exploring events, controls and Accessing Databases with JDBC.		
Total : 45 Periods		

Text Books
1. Herbert Schildt,, “The Complete Reference – JAVA”, Tata McGraw-Hill, 12th Edition, 2022. 2. Y. Daniel Liang, “Introduction to Java programming comprehensive version”, Pearson, 10th Edition, 2018. 3. Paul Deitel and Harvey Deitel ,”JAVA - How to Program”, Pearson,11th Edition, 2017.
Reference Books
1. Cay Horstmann, “Core JAVA”, 11th Edition, Pearson, 2020. 2. Herbert Schildt, “JAVA - A Beginner’s Guide”, Tata McGraw-Hill, 8th Edition, 2020.
Additional / Web References
1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview 2. https://archive.nptel.ac.in/courses/106/105/106105225/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1		2								2	2	2	2	2	
CO 2		1			3					2	2	2	2	2	
CO 3		2		2	3					2	2	2	2	2	

CO 4		2			3					2	2	2	2	2	
CO 5		2	2							2	2	2	2	2	
Average		2	2	2	3					2	2	2	2	2	
3– High				2 – Medium				1 – Low				'-“ - No Correlation			

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 Hours	2.5 Units	100	12	24	60
CIA II	3 Hours	2.5 Units	100	12		
Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (marks during CIA I and 8 marks during CIA II)					16	
TOTAL					40	60

23CS407	SOFTWARE ENGINEERING	L	T	P	C					
		3	0	0	3					
Category	Professional Core Course									
Pre requisites	Nil									
Course Objectives										
The course is intended to make the students to										
<ul style="list-style-type: none"> • Acquire the systematic approach related to the design, development and maintenance of a software system. • Making use of modern tools and Techniques for software Development. • Develop the quality code for the software Development. • Applying various testing techniques for the software development • Analyze using Testing tools for Automation. 										
Course Outcomes										
On successful completion of the course, students will be able to										
CO. No	Course Outcome	Bloom's Level								
CO 1	Outline the software development methodologies from various real life scenarios		Understand							
CO 2	Experiment with modern tools and techniques to develop scalable, maintainable, and reliable software systems.		Apply							
CO 3	Utilize the coding strategies and techniques to write well-structured, efficient, and error-free code		Apply							
CO 4	Select specific modern testing tools to ensure the quality and reliability of software products		Apply							
CO 5	Categorize the elements, structure, and positioning of an Enterprise Architecture framework used for successful digital business transformation.		Analyze							
Course Contents										
Unit – I	Software Development Process		9							
Phases in Software Development - Traditional Software Development Models – Agile Methodologies - Agile Scaling Frameworks - Lean Software Development – Software Requirements Specification (SRS) - Project Scheduling and Estimation.										
Unit – II	Requirements Analysis and Specifications		9							

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document — Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

Unit – III	Software Design	9
Design process — Design Concepts-Design Model— Design Heuristic — Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.		
Unit – IV	Testing and Maintenance	9
Software testing fundamentals-Internal and external views of Testing-white box testing — basis path testing-control structure testing-black box testing- Regression Testing — Unit Testing — Integration Testing — Validation Testing — System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.		
Unit – V	Project Management	9
Software Project Management: Estimation — LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model — Project Scheduling — Scheduling, Earned Value Analysis Planning — Project Plan, Planning Process, RFP Risk Management — Identification, Projection — Risk Management-Risk Identification-RMMM Plan-CASE TOOLS..		
Total : 45 Periods		

Text Books

1. Roger S.Pressman, "Software Engineering: A Practitioner's Approach", McGraw Hill International edition, Seventh edition, 2010.
2. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.
3. Carl Cocchiaro, "Selenium Framework Design in Data-Driven Testing", 2018,

Reference Books

1. Glenford J. Myers, Corey Sandler, Tom Badgett, "The Art of Software Testing", 3rd Edition, 2012, John Wiley & Sons, Inc
2. Elfriede Dustin, Thom Garrett, Bernie Gaurf, "Implementing Automated Software Testing", 2009, Pearson Education, Inc.

Additional / Web References

1. <https://librarysearch.centennialcollege.ca/permalink/>
2. <https://link.springer.com/shop/apress/software-engineering-os-books/en-eu/>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific

Outcomes (PSOs)																
COs	POs													PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO 1		2								2	2	2	2	2		
CO 2		1			3					2	2	2	2	2		
CO 3		2		2	3					2	2	2	2	2		
CO 4		2			3					2	2	2	2	2		
CO 5		2	2							2	2	2	2	2		
Average		2	2	2	3					2	2	2	2	2		
3– High				2 – Medium				1 – Low				‘-“ - No Correlation				

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*	
CIA I	3 Hours	2.5 Units	100	12	24	60	
CIA II	3 Hours	2.5 Units	100	12			
Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (marks during CIA I and 8 marks during CIA II)				16			
TOTAL				40		60	

23AD401	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3
Category	Professional Core Courses				
Pre requisites	Probability and Statistics				

Course Objectives

The course is intended to make the students to

- Describe agent types and identify uninformed search strategy for a specific problem
- Compare the efficiency of various searching techniques
- Build solutions using game theory and CSP techniques for real world problems
- Apply Inference rules to the given Knowledge Base
- Explain probabilistic reasoning for uncertainty factors

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
Theory		
CO 1	Describe the types and behavior of problem solving agents and apply uninformed search strategies to solve real-world problems	Apply
CO 2	Compare the efficiency of various searching techniques in solving a problem	Apply
CO 3	Develop intelligent algorithms for constraint satisfaction problems and design intelligent systems for Game Playing.	Apply
CO 4	Apply Inference rules to the given Knowledge Base for theorem proving	Apply
CO 5	Outline uncertainty factors with Probabilistic and Bayesian models	Understand

Course Contents		
UNIT – I	INTELLIGENT AGENTS	9
Introduction to AI - Foundations of AI - History of AI - State of the Art - Risks and Benefits of AI - Agents and Environments - Concept of Rationality - Nature of Environments - Structure of Agents.. Problem solving agents – search algorithms – uninformed search strategies: BFS -DFS - Dijkstra's algorithm - Bidirectional search - Depth-limited and iterative deepening search.		
UNIT – II	SEARCHING PROBLEMS	9
Heuristic search strategies: Greedy best-first search - A* search - Search contours - Memory-bounded search - Heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments.		
UNIT – III	ADVERSARIAL SEARCH AND CSP	9
Game theory – optimal decisions in games – alpha-beta search – monte-carlo tree search – stochastic games – partially observable games. Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP.		
UNIT – IV	LOGICAL REASONING	9
Knowledge-based agents – propositional logic – propositional theorem proving – effective propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-order logic – forward chaining – backward chaining – resolution.		
UNIT – V	PROBABILISTIC REASONING	9
Knowledge Representation - Ontological Engineering - Categories and Objects - Reasoning Systems for Categories - Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.		
Total: 45 Periods		

Text Books
<ol style="list-style-type: none"> 1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021. 2. Kevin Knight, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008.
Reference Books

- | |
|--|
| <ol style="list-style-type: none"> 1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007 2. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006 3. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013. |
|--|

Additional / Web References

- | |
|--|
| <ol style="list-style-type: none"> 1. https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence 2. http://aima.cs.berkeley.edu/ 3. https://ai.google/education/ 4. https://www.coursera.org/courses?query=artificial%20intelligence 5. https://www.edureka.co/blog/artificial-intelligence-with-python/ |
|--|

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	1	1	-	-	-	-	-	-	-	-	-	2	1	1
CO 2	3	2	2	1	-	-	-	-	-	-	-	-	2	1	1
CO 3	2	2	2	1	-	-	-	-	-	-	-	-	2	1	1
CO 4	2	3	1	1	-	-	-	-	-	-	-	-	2	1	1
CO 5	2	3	1	1	-	-	-	-	-	-	-	-	2	1	1
Average	3	2	2	1	-	-	-	-	-	-	-	-	2	1	1

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
<ul style="list-style-type: none"> • Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., • (8 marks during CIA I and 8 marks during CIA II) 					16	
Total					40	60

23HS101	UNIVERSAL HUMAN VALUES – II (Common to all B.E./B.Tech. Programmes)	L	T	P	C
		3	0	0	3
Category	HSMC				
Pre requisites	Nil				

Course Objectives

The course is intended to

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

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Associate themselves, and their surroundings (family, society, nature)	Understand
CO 2	Summarize responsibilities in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind	Understand
CO 3	Express better critical ability	Understand
CO 4	Interpret their commitments towards what they have understood (human values, human relationship and human society)	Understand
CO 5	Use what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction	Apply

Course Contents

UNIT – I	COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION	9
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Purpose and motivation for the course, recapitulation from Universal Human Values-I, Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration- Continuous Happiness and Prosperity- A look at basic Human Aspirations- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority - Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario - Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT – II	UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!	9
Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility - Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) - Understanding the characteristics and activities of 'I' and harmony in 'I' - Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail - Programs to ensure Sanyam and Health.		
UNIT – III	UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN RELATIONSHIP	9
Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship - Understanding the meaning of Trust; Difference between intention and competence – Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship - Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals - Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.		
UNIT – IV	UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE	9
Understanding the harmony in the Nature - Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation in nature - Understanding Existence as Co-existence of mutually interacting units in all pervasive space - Holistic perception of harmony at all levels of existence.		
UNIT – V	IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS	9
. Natural acceptance of human values - Definitiveness of Ethical Human Conduct - Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order - Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. - Case studies of typical holistic technologies, management models and production systems - Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations - Sum up.		

Total : 45 Hours

Text Books

1. Gaur R R, Asthana R, Bagaria G P, "A Foundation Course in Human Values and Professional Ethics", Excel Books, second revised edition, New Delhi, 2019.
2. Gaur R R, Sangal R, Bagaria G P, "Human Values and Professional Ethics", Excel Books, New Delhi, first edition, 2010.
3. Tripathi A N, "Human Values", New Age International Publishers, third Edition, New Delhi, 2004.

Reference Books

1. Nagaraj A, "Jeevan Vidya Ek Parichaya, Mathyash darshan", audio book, 2024.
2. Gandhi M K, "The Story of My Experiments with Truth" reprint 2020.

Mapping of Course Outcomes (COs) with Programme Outcomes (POs)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	-	-	-	-	-	3	2	3	2	2	-	2
CO 2	-	-	-	-	-	3	2	3	2	2	-	2
CO 3	-	-	-	-	-	3	2	3	2	2	-	2
CO 4	-	-	-	-	-	3	2	3	2	2	-	2
CO 5	-	-	-	-	-	3	2	3	2	2	-	2
Average	-	-	-	-	-	3	2	3	2	2	-	2
3 – High			2 – Medium			1 – low			‘-’ - No Correlation			

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for internal marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 Hours	2.5 Units	100	12	24	60
CIA II	3 Hours	2.5 Units	100	12		

Objective Test / Online Quiz, Assignment / Case study , Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., (marks during CIA I and 8 marks during CIA II)	16	
TOTAL	40	60

23AD406	DATA MINING AND DATA WAREHOUSING	L	T	P	C
		3	0	2	4
Category	Professional Core Courses				
Pre requisites	Database Management Systems				

Course Objectives

The course is intended to make the students to

- Understand the principles of Data warehousing and Data Mining.
- Be familiar with the Data warehouse architecture and its Implementation.
- Know the Architecture of a Data Mining system.
- Understand the various Data preprocessing Methods.
- Perform classification and prediction of data.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
Theory		
CO 1	Demonstrate knowledge on Data Warehousing architecture, Multidimensional models and OLAP operations.	Apply
CO 2	Apply data preprocessing techniques to produce refined data.	Apply
CO 3	Use Association rules and classification techniques for data categorization.	Apply
CO 4	Use clustering techniques for grouping similar data items and identify outliers.	Apply
CO 5	Understand Data Mining trends and applications.	Understand

Course Contents

UNIT – I	DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING	9
Data Warehouse, Operational Database Systems versus Data Warehouses, A Multi tiered Architecture, A Multidimensional Data Model, Stars, Snowflakes and Fact Constellations: Schemas, Role of Concept hierarchies, Measures, OLAP Operations, From online Analytical processing to Multidimensional Data Mining, Indexing OLAP Data.		
UNIT – II	DATA MINING AND DATA PREPROCESSING	9
Introduction to Data Mining, kinds of data, kinds of patterns, major issues in Data Mining, Data Pre-processing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Discretization.		
UNIT – III	ASSOCIATIONS AND CLASSIFICATION	9
Basic Concepts, Frequent itemset Mining Methods, pattern evaluation methods- From Association Mining to Correlation Analysis, Classification, Decision Tree Introduction, Bayesian Classification Methods, Rule Based Classification, Prediction: Linear Regression.		
UNIT – IV	CLUSTER ANALYSIS	9
Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods-k-Means and K-Medoids, Hierarchical methods- Agglomerative and divisive method, Density-Based Method-DBSCAN, Grid-Based Method-STING, Outlier Analysis.		
UNIT – V	DATA MINING TRENDS	9
Mining Complex Data Types: Mining sequence data, Mining other kinds of data: Spatial, Text, Multimedia and Web data. Data Mining Trends: Mining Complex Data Types, Methodologies of Data Mining, Data Mining Applications, Data Mining and Society, Data Mining Trends.		
Total: 45 Periods		

List of Experiments

S.No.	Name of the Experiment	CO	Bloom's Level
1	Installation of WEKA Tool	CO1	Apply
2	Creating new Arff File	CO1	Apply

3	Data Processing Techniques on Data set	CO2	Apply
4	Data cube construction – OLAP operations	CO2	Apply
5	Implementation of Apriori algorithm	CO3	Apply
6	Implementation of FP- Growth algorithm	CO3	Apply
7	Implementation of Decision Tree Induction	CO3	Apply
8	Calculating Information gains measures	CO4	Apply
9	Classification of data using Bayesian approach	CO4	Apply
10	Implementation of K-means algorithm	CO5	Apply
11	Case Study: Create Placement.arff file to identify the students who are eligible for placements using KNN	CO5	Apply

Text Books

1. Jiawei Han, Micheline Kamber and Jian Pei "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.
2. Ralph Kimball, "The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling", Third edition, 2013.

Reference Books

1. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

Additional / Web References

1. <https://nptel.ac.in/courses/106105174>
2. <https://archive.nptel.ac.in/courses/106/106/106106093>
3. <https://www.udemy.com/course/weka-data-mining-with-open-source-machine-learning-tool/>
4. <https://www.weka.io/>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	2	1	-	-	-	-	-	-	-	-	2	2	2
CO 2	2	2	3	-	-	-	-	-	-	-	-	-	2	2	2
CO 3	2	2	3	-	-	-	-	-	-	-	-	-	2	2	2
CO 4	2	3	2	1	-	-	-	-	-	-	-	-	2	2	2
CO 5	3	2	1	1	1	-	-	-	-	-	-	-	2	2	2
Average	3	2	3	1	1	-	2	2	2						

Assessment	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
Theory Component						
CIA I	3 hours	2.5 units	100	10	20	50
CIA II	3 hours	2.5 units	100	10		
Practical Component						
Observation & Analysis of Experimental results, Viva Voce, Quiz based on rubrics.		All Experiments	75	22.5	30	-
			25	7.5		
Total				50	50	

23AD401	ARTIFICIAL INTELLIGENCE LABORATORY	L	T	P	C
		0	0	3	1.5
Category	Professional Core Courses				
Pre requisites	Probability and Statistics				

Course Objectives

The course is intended to make the students to

- Identify search strategies for a specific problem
- Build solutions using game theory
- Implement CSP techniques for real world problems
- Apply Inference rules to the given Knowledge Base
- Construct models using probabilistic reasoning for uncertainty factors

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
Laboratory		
CO 1	Apply search strategies.	Apply
CO 2	Build game playing techniques.	Apply
CO 3	Implement CSP techniques.	Apply
CO 4	Develop systems with logical reasoning.	Apply
CO 5	Construct systems with probabilistic reasoning.	Apply

List of Experiments

S.N o.	Name of the Experiment	CO	Bloom's Level
1	Implement basic search strategies – 8-Puzzle, 8 - Queens problem and Cryptarithmetic	CO6	Apply
2	Implement A* and memory bounded A* algorithms	CO6	Apply
3	Implement Minimax algorithm for game playing (Alpha-Beta pruning)	CO7	Apply
4	Solve constraint satisfaction problems	CO8	Apply
5	Implement propositional model checking algorithms	CO9	Apply
6	Implement forward chaining, backward chaining, and resolution strategies	CO9	Apply
7	Build naive Bayes models	CO10	Apply
8	Implement Bayesian networks and perform inferences	CO10	Apply
9	Miniproject		Create

Text Books

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.
2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008.

Reference Books

1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007
2. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006
3. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013.

Additional / Web References

1. <https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence>
2. <http://aima.cs.berkeley.edu/>
3. <https://ai.google/education/>
4. <https://www.coursera.org/courses?query=artificial%20intelligence>
5. <https://www.edureka.co/blog/artificial-intelligence-with-python/>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	3	2	1	-	-	-	-	-	-	-	2	1	1
CO 2	2	2	3	2	1	-	-	-	-	-	-	-	2	1	1
CO 3	2	2	3	2	1	-	-	-	-	-	-	-	2	1	1
CO 4	2	2	3	2	1	-	-	-	-	-	-	-	2	1	1
CO 5	2	2	3	2	1	-	-	-	-	-	-	-	2	1	1
Average	2	2	3	2	1	-	-	-	-	-	-	-	2	1	1

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record, Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	
		Total	60		40

23CS409	OBJECT ORIENTED PROGRAMMING LABORATORY	L 0	T 0	P 3	C 1.5
Category	Professional Core Course				
Pre requisites	Nil				

Course Objectives

The course is intended to make the students to

- Build software development skills using java programming for real-world applications.
- Apply the concepts of packages, interfaces, inheritance, exception handling and file processing.
- Develop applications using generic programming and event handling
- Develop GUIs and event driven programming application
- Develop web applications using JAVA

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Build java programs using object oriented programming concepts	Apply
CO 2	Develop simple applications using object oriented concepts	Apply
CO 3	Make use of multithreading, and generics concepts	Apply
CO 4	Create GUIs and event driven programming applications for real world problems	Apply
CO 5	Implement and deploy web applications using Java	Apply

List of Exercises

S.No	Name of the Exercises	CO	Bloom's Level
1.	Solve problems by using sequential search, binary search, and quadratic sorting algorithms (selection, insertion)	CO1	Apply
2.	Develop stack and queue data structures using classes and objects.	CO1	Apply
3.	Develop a java application for an Employee Database to generate pay slips for employees with their gross and net salary.	CO2	Apply
4.	Write a Java Program to implement different forms of inheritance	CO2	Apply
5.	Solve the above problem using an interface	CO2	Apply
6.	Implement exception handling and creation of user defined exceptions.	CO3	Apply

7.	Write a java program that implements a multi-threaded applications	CO3	Apply
8.	Write a program to perform file operations.	CO4	Apply
9.	Develop applications to demonstrate the features of generics classes.	CO4	Apply
10.	Create an XML database and validate it using XML schema.	CO5	Apply
11.	Develop applications using Java Frameworks	CO5	Apply

Total: 45 Periods

Reference Books
1. Manual-prepared by SSCET.
Additional / Web References
1. https://cs-programiz.blogspot.com/2018/01/write-java-program-to-create-abstract.html
2. https://www.udemy.com/course/javafx-master-class-create-a-banking-application-2022/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1		2								2	2	2	2	2	
CO 2		1			3					2	2	2	2	2	
CO 3		2		2	3					2	2	2	2	2	
CO 4		2			3					2	2	2	2	2	
CO 5		2	2							2	2	2	2	2	
Average		2	2	2	3					2	2	2	2	2	
	3– High			2 – Medium			1 – Low			'-' - No Correlation					

S. No.	Assessment Method	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks
1	Observation, Analysis of Experimental results & Record Viva-voce based on rubrics.	100	75	45	40
2	Model Examination	100	25	15	

Total	60	40
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20ME701	DESIGN THINKING	L	T	P	C					
		2	0	0	2					
Category	Employment Enhancement Course									
Pre requisites	Nil									
Course Objectives										
<p>The objectives of this course are to</p> <ul style="list-style-type: none"> • Acquire knowledge in Design thinking concepts and process. • To inculcate attitude to solve societal problems using design thinking tools • Develop skills in solving problems using ideation tools. • Conceive, conceptualize, design and demonstrate innovative ideas using prototypes • Apply concepts for testing of prototypes 										

Course Outcomes		
On successful completion of the course, students will be able to		
CO. No.	Course Outcome	Bloom's Level
CO 1	Apply Design thinking concepts and principles to perform human centered design process for creative problem solving.	Apply
CO 2	Derive empathy maps to visualize user attitudes and behavior for gaining insights of customers.	Apply
CO 3	Develop innovative products or services for a customer base using ideation techniques.	Apply
CO 4	Use design thinking tools to build prototypes for complex problems using gathered user requirements.	Apply
CO 5	Improve prototype by testing it with a specific set of users for making it sustainable by following ethics.	Apply

Course Contents		
UNIT – I	DESIGN THINKING PROCESS	6
Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, Design thinking tools.		
UNIT – II	EMPATHIZE	6
Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas.		
UNIT – III	IDEATION	6

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

UNIT – IV	PROTOTYPE	6
Prototype - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype.		
UNIT – V	TESTING OF PROTOTYPES	6
Prototyping for physical products: uniqueness for physical products, Prototyping for digital products: What's unique for digital products, Preparation; Preparation; Testing prototypes with users.		
Total : 30 Hours		

Text Books

1. Robert A Curedale, Design Thinking Process & Methods 4th Edition, December 2017,
2. Michael G. Luchs, Scott Swan , Abbie Griffin, "Design Thinking – New Product Essentials from PDMA", Wiley, 2015.

Reference Books

1. Ulrich &Eppinger, "Product Design and Development", 3rd Edition, McGraw Hill, 2004
2. Idris Mootee, "Design Thinking for Strategic Innovation", 2013, John Wiley & Sons Inc
3. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly, 2017.
4. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking", Tata Mc Graw Hill, First Edition,2019.

Additional / Web References

1. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>
2. <https://nptel.ac.in/courses/110106124/>
3. <https://hbr.org/2018/09/why-design-thinking-works>

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3				3							2		3	
CO 2	2	3			3							2		3	
CO 3	2		3		3							2		3	
CO 4	2		3		3							2		3	
CO 5	2			3	3							2		3	

Average	2. 5	3	3	3							2		3	
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3 – High

2 – Medium

1 – low

‘-’ - No Correlation

Assessment Components	Duration	Syllabus to be covered	Max. Marks	Weightage for Internal Marks	Continuous Internal Assessment Marks	End Semester Examination Marks*
CIA I	3 hours	2.5 units	100	12	24	60
CIA II	3 hours	2.5 units	100	12		
<ul style="list-style-type: none"> • Objective Test / Online Quiz, Assignment / Case study Seminar / Tutorial, Role Play, Poster Presentation, Group Discussions, Oral Presentation, Mini Project etc., • (8 marks during CIA I and 8 marks during CIA II) 				16		
Total				40	60	

