



**KSR** College of  
Engineering

AN AUTONOMOUS INSTITUTION



NAAC ACCREDITED **A++** | NBA ACCREDITED PROGRAMMES | 

**B.E. - COMPUTER SCIENCE AND ENGINEERING  
(CYBER SECURITY)**

**REGULATIONS 2024**

**(Academic Year 2024-25 Onwards)**

**Curriculum & Syllabus  
Semester I to IV**





**K.S.R. COLLEGE OF ENGINEERING: TIRUCHENGODE - 637 215  
(Autonomous)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)  
B.E. – Computer Science and Engineering (Cyber Security)  
(REGULATIONS 2024)**

**Vision of the Institution**

<b>IV</b>	To become a globally renowned institution in Engineering and Management, committed to providing holistic education that fosters innovation and sustainable development
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**Mission of the Institution**

<b>IM 1</b>	Accomplish value-based quality education through innovative teaching-learning process.
<b>IM 2</b>	Enrich Engineering and Managerial Skills through cutting-edge laboratories to meet the demands of global integration.
<b>IM 3</b>	Enhance innovation and research to meet the evolving needs of industry, society, and sustainable development.

**Vision of the Department / Programme: (Computer Science and Engineering (Cyber Security))**

<b>DV</b>	To produce ethical cybersecurity technocrat for supporting digital ecosystems and sustainable global development.
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**Mission of the Department / Programme: (Computer Science and Engineering (Cyber Security))**

<b>DM 1</b>	Deliver quality education in cybersecurity through Immersive learning.
<b>DM 2</b>	Impart interdisciplinary skills to meet global cybersecurity challenges through State of art Laboratory.
<b>DM 3</b>	Foster research, innovation, and ethical practices to promote sustainable digital security.

**Programme Educational Objectives (PEOs): (Computer Science and Engineering (Cyber Security))**

<b>The graduates of the programme will be able to</b>	
<b>PEO 1</b>	<b>Core Competency:</b> Analyze and manage security incidents through effective threat detection and response strategies.
<b>PEO 2</b>	<b>Professionalism:</b> Exhibit interdisciplinary skills to address cybersecurity challenges with ethical integrity that contribute to global cyber resilience.
<b>PEO 3</b>	<b>Career Development:</b> Engage in lifelong learning, research and entrepreneurship to foster innovation and lead advancements in cyber security

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**Program Outcomes (POs)**

PO1	<b>Engineering Knowledge:</b> Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	<b>Problem Analysis:</b> Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	<b>Design/Development of Solutions:</b> Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	<b>Conduct Investigations of Complex Problems:</b> Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	<b>Engineering Tool Usage:</b> Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	<b>The Engineer and The World:</b> Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	<b>Ethics:</b> Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	<b>Individual and Collaborative Team work:</b> Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	<b>Communication:</b> Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	<b>Project Management and Finance:</b> Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	<b>Life-Long Learning:</b> Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

**PROGRAMME SPECIFIC OUTCOMES (PSO's)**

PSO1	<b>Secure System Design:</b> Design and implement secure systems to protect data and infrastructure from cyber threats.
PSO2	<b>Threat Detection and Response:</b> Detect and respond to cyber threats using modern tools and ensure compliance with relevant standards.

  
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Department		Computer Science and Engineering (Cyber Security)										
Programme		B.E.										
SEMESTER I												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit	Max. Marks		
				L	T	P	SL	Tot		C=T/30	CA	ES
Induction Programme			-	-	-	-	-	-	-	-	-	-
<b>THEORY COURSES</b>												
1.	24ENT19	Professional Communication	HSMC	45	0	0	45	90	3	40	60	100
2.	24EET06	Basics of Electrical and Electronics Engineering	ESC	45	0	0	45	90	3	40	60	100
3.	24ITT16	Programming for Problem Solving	ESC	45	0	0	45	90	3	40	60	100
4.	24GET19	தமிழ் மரபு / Heritage of Tamils	HSMC	15	0	0	15	30	1	40	60	100
<b>THEORY COURSES WITH LABORATORY COMPONENT</b>												
5.	24MAI19	Matrices and Calculus	BSC	30	15	30	45	120	4	50	50	100
6.	24CHI06	Chemistry for Engineers	BSC	45	0	30	45	120	4	50	50	100
<b>LABORATORY COURSES</b>												
7.	24ITP16	Programming for Problem Solving Laboratory	ESC	0	0	30	0	30	1	60	40	100
8.	24MEP16	Engineering Graphics Laboratory	ESC	15	0	30	15	60	2	60	40	100
9.	24GEP16	Engineering Experience Laboratory	ESC	0	0	30	0	30	1	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
10.	24SSP19	Aptitude and Coding Skills-I	EEC	0	0	30	0	30	1	60	40	100
<b>TOTAL</b>				<b>240</b>	<b>15</b>	<b>180</b>	<b>255</b>	<b>690</b>	<b>23</b>	<b>1000</b>		

  
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Applicable for the students admitted from 2024 -2025 onwards

SEMESTER II												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>THEORY COURSES</b>												
1	24CST29	Python Programming	PCC	45	0	0	45	90	3	40	60	100
2	24CST21	Design Thinking	PCC	30	0	0	30	60	2	40	60	100
3	24GET29	தமிழரும் தொழில் நுட்பமும்/ Tamil and Technology	HSMC	15	0	0	15	30	1	40	60	100
<b>THEORY COURSES WITH LABORATORY COMPONENT</b>												
4	24MAI29	Probability and Statistics	BSC	30	15	30	45	120	4	50	50	100
5	24PHI07	Engineering Physics	BSC	45	0	30	45	120	4	50	50	100
6	24ECI26	Digital Principles and System Design	ESC	45	0	30	45	120	4	50	50	100
<b>LABORATORY COURSES</b>												
7	24ENP29	Professional Communication Laboratory	HSMC	0	0	30	0	30	1	60	40	100
8	24CSP29	Python Programming Laboratory	PCC	0	0	30	0	30	1	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
9	24SSP29	Aptitude and Coding Skills -II	EEC	0	0	30	0	30	1	60	40	100
<b>MANDATORY COURSE</b>												
10		Mandatory Course - I	MC	0	0	30	0	30	0	100	-	100
<b>TOTAL</b>				<b>210</b>	<b>15</b>	<b>210</b>	<b>225</b>	<b>660</b>	<b>21</b>	<b>1000</b>		
SEMESTER III												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>THEORY COURSES</b>												
1	24MAT37	Discrete Mathematical Structures	BSC	45	15	0	60	120	4	40	60	100
2	24CBT31	Operating Systems and security	PCC	45	0	0	45	90	3	40	60	100
3	24CBT36	Data Structures and Algorithms	PCC	45	0	0	45	90	3	40	60	100
4	24CBT33	Programming in JAVA	PCC	45	0	0	45	90	3	40	60	100
5	24CST38	Computer Organization and Architecture	PCC	45	0	0	45	90	3	40	60	100
<b>LABORATORY COURSES</b>												
6	24CBP31	Operating Systems and security Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
7	24CBP37	Data Structures and Algorithms Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
8	24CBP33	Programming in JAVA Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
9	24CBP36	Design Studio-I	PCC	0	0	30	0	30	1	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
10	24SDP39	Soft Skills Development-III	EEC	0	0	30	0	30	1	60	40	100
<b>TOTAL</b>				<b>225</b>	<b>15</b>	<b>195</b>	<b>240</b>	<b>675</b>	<b>22.5</b>	<b>1000</b>		



SEMESTER IV												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>THEORY COURSES</b>												
1	24MAT46	Numerical and Computational Techniques	BSC	45	15	0	60	120	4	40	60	100
2	24ITT46	Database Management Systems	PCC	45	0	0	45	90	3	40	60	100
3	24CST46	Design and Analysis of Algorithms	PCC	45	0	0	45	90	3	40	60	100
4	24CBT41	Cryptography	PCC	45	0	0	45	90	3	40	60	100
<b>THEORY COURSES WITH LABORATORY COMPONENT</b>												
5	24CBI46	Advanced JAVA Programming	PCC	15	0	90	15	120	4	50	50	100
<b>LABORATORY COURSES</b>												
6	24CSP46	Design and Analysis of Algorithms Laboratory	PCC	0	0	60	0	60	2	60	40	100
7	24ITP46	Database Management Systems Laboratory	PCC	0	0	60	0	60	2	40	60	100
8	24CSP47	Design Studio-II	PCC	0	0	30	0	30	1	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
9	24SDP49	Soft Skills Development-IV	EEC	0	0	30	0	30	1	60	40	100
				<b>TOTAL</b>	<b>195</b>	<b>15</b>	<b>270</b>	<b>210</b>	<b>690</b>	<b>23</b>	<b>900</b>	
*- The students should undergo two weeks internship during the IV semester summer vacation.												
SEMESTER V												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>THEORY COURSES</b>												
1	24ITT56	Computer Networks	PCC	45	0	0	45	90	3	40	60	100
2	24CBT51	Automata and Compiler Design	PCC	45	30	0	45	120	4	40	60	100
3	24ECT56	Microprocessors and Microcontrollers	PCC	45	0	0	45	90	3	40	60	100
4		Professional Elective – I	PEC	45	0	0	45	90	3	40	60	100
<b>THEORY COURSES WITH LABORATORY COMPONENT</b>												
5	24CBI51	Artificial Intelligence	PCC	45	0	30	45	120	4	50	50	100
6	24CBI52	Ethical Hacking	PCC	45	0	30	45	120	4	50	50	100
<b>LABORATORY COURSES</b>												
7	24ITP56	Computer Networks Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
8	24ECP56	Microprocessors and Microcontrollers Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
9	24CBP51	Internship	EEC	0	0	0	30	30	1	100	-	100
10	24CBP52	Industry Oriented Course-I	EEC	0	0	0	0	0	1	100	-	100
11	24CBP53	Seminar Presentation	EEC	0	0	30	0	30	1	100	-	100
<b>MANDATORY COURSE</b>												
12		Mandatory Course - II	MC	30	0	0	0	30	0	100	-	100
				<b>TOTAL</b>	<b>300</b>	<b>30</b>	<b>180</b>	<b>300</b>	<b>810</b>	<b>27</b>	<b>1200</b>	
*- The students should undergo two weeks internship during the IV semester summer vacation.												

  
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SEMESTER VI												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>THEORY COURSES</b>												
1	24CBT61	Penetration Testing and Vulnerability Assessment	PCC	45	0	0	45	120	3	40	60	100
2	24GET69	Entrepreneurship Development	HSMC	45	0	0	45	90	3	40	60	100
3	24GET09	Universal Human Values and Ethics	HSMC	45	0	0	45	90	3	40	60	100
4		Professional Elective – II	PEC	45	0	0	45	90	3	40	60	100
5		Professional Elective – III	PEC	45	0	0	45	90	3	40	60	100
<b>LABORATORY COURSE</b>												
6	24CBP61	Penetration Testing and Vulnerability Assessment Laboratory	PCC	0	0	45	0	45	1.5	60	40	100
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
7	24CBP62	Industry Oriented Course-II	EEC	0	0	0	0	0	1	100	-	100
8	24CBP63	Technical Comprehension	EEC	0	0	30	0	30	1	100	-	100
9	24CBP64	Mini Project	EEC	0	0	60	0	60	2	60	40	100
<b>MANDATORY COURSE</b>												
10		Mandatory Course - III	MC	30	0	0	0	30	0	100	-	100
<b>TOTAL</b>				<b>255</b>	<b>0</b>	<b>135</b>	<b>225</b>	<b>645</b>	<b>20.5</b>	<b>1000</b>		
<b>SEMESTER VII</b>												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>THEORY COURSES</b>												
1	24CBT71	Malware Analysis	PCC	45	0	0	45	90	3	40	60	100
2	24CST76	Standards in Computer Science and Engineering	PCC	15	0	0	15	30	1	100	-	100
3		Professional Elective – IV	PEC	45	0	0	45	90	3	40	60	100
4		Professional Elective – V	PEC	45	0	0	45	90	3	40	60	100
5		Professional Elective – VI	PEC	45	0	0	45	90	3	40	60	100
6		Open Elective –I	OEC	45	0	0	45	90	3	40	60	100
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
7	24CBP71	Project work Phase - I	EEC	0	0	60	0	60	2	60	40	100
<b>TOTAL</b>				<b>240</b>	<b>0</b>	<b>60</b>	<b>240</b>	<b>540</b>	<b>18</b>	<b>700</b>		
<b>SEMESTER VIII</b>												
S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>EMPLOYABILITY ENHANCEMENT COURSE</b>												
1	24CBP81	Project Work Phase – II	EEC	0	0	240	0	240	8	60	40	100
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>240</b>	<b>0</b>	<b>240</b>	<b>8</b>	<b>100</b>		
<b>TOTAL CREDITS</b>									<b>163</b>			

**TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE=163**

Note: HSMC- Humanities and Social Sciences including Management courses, BSC - Basic Science Courses, ESC - Engineering Science Courses, PCC - Professional core courses, PEC- Professional Elective courses, OEC - Open Elective courses, EEC – Employability Enhancement Courses & MC- Mandatory courses.

  
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	<b>Department</b> Computer Science and Engineering (Cyber Security)	<b>Programme</b> B.E.

HUMANITIES, SOCIAL SCIENCE AND MANAGEMENT COURSES (HSMC)												
S. No.	Course Code	Course Title	Semester	Periods per Sem					Credit	Max. Marks		
				L	T	P	SL	Tot		C=T/30	CA	ES
1	24ENT19	Professional Communication	I	45	0	0	45	90	3	40	60	100
2	24GET19	தமிழ் மரபு/ Heritage of Tamils	I	15	0	0	15	30	1	40	60	100
3	24GET29	தமிழரும் தொழில் நுட்பமும்/ Tamils and Technology	II	15	0	0	15	30	1	40	60	100
4	24ENP29	Professional Communication Laboratory	II	0	0	30	0	30	1	60	40	100
6	24GET69	Entrepreneurship Development	VI	45	0	0	45	90	3	40	60	100
7	24GE09	Universal Human Values and Ethics	VI	45	0	0	45	90	3	40	60	100
<b>TOTAL</b>				<b>165</b>	<b>0</b>	<b>30</b>	<b>165</b>	<b>360</b>	<b>12</b>			

BASIC SCIENCE COURSES (BSC)												
S. No.	Course Code	Course Title	Semester	Periods per Sem					Credit	Max. Marks		
				L	T	P	SL	Tot		C=T/30	CA	ES
1	24MAI19	Matrices and Calculus	I	30	15	30	45	120	4	50	50	100
2	24CHI06	Chemistry for Engineers	I	45	0	30	45	120	4	50	50	100
3	24MAI29	Probability and Statistics	II	30	15	30	45	120	4	50	50	100
4	24PHI07	Engineering Physics	II	45	0	30	45	120	4	50	50	100
5	24MAT37	Discrete Mathematical Structures	III	45	15	0	60	120	4	40	60	100
6	24MAT46	Numerical and Computational Techniques	IV	45	15	0	60	120	4	40	60	100
<b>TOTAL</b>				<b>240</b>	<b>60</b>	<b>120</b>	<b>300</b>	<b>720</b>	<b>24</b>			

  
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ENGINEERING SCIENCE COURSES(ESC)												
S. No.	Course Code	Course Title	Semester	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
1.	24EET06	Basics of Electrical and Electronics Engineering	I	45	0	0	45	90	3	40	60	100
2.	24ITT16	Programming for Problem Solving	I	45	0	0	45	90	3	40	60	100
3.	24ITP16	Programming for Problem Solving Laboratory	I	0	0	30	0	30	1	60	40	100
4.	24MEP16	Engineering Graphics Laboratory	I	15	0	30	15	60	2	60	40	100
5.	24GEP16	Engineering Experience Laboratory	I	0	0	30	0	30	1	60	40	100
6.	24ECI26	Digital Principles and System Design	II	45	0	30	45	120	4	50	50	100
<b>TOTAL</b>				<b>150</b>	<b>0</b>	<b>120</b>	<b>150</b>	<b>420</b>	<b>14</b>			

EMPLOYABILITY ENHANCEMENT COURSES (EEC)												
S. No.	Course Code	Course Title	Semester	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
1	24SSP19	Aptitude and Coding Skills-I	I	0	0	30	0	30	1	60	40	100
2	24SSP29	Aptitude and Coding Skills -II	II	0	0	30	0	30	1	60	40	100
3	24SDP39	Soft Skills Development -III	III	0	0	30	0	30	1	60	40	100
4	24SDP49	Soft Skills Development -IV	IV	0	0	30	0	30	1	60	40	100
5	24CBP51	Internship	V	0	0	0	30	30	1	100	-	100
6	24CBP52	Industry Oriented Course-I	V	0	0	0	0	0	1	100	-	100
7	24CBP53	Seminar Presentation	V	0	0	30	0	30	1	100	-	100
8	24CBP62	Industry Oriented Course-II	VI	0	0	0	0	0	1	100	-	100
9	24CBP63	Technical Comprehension	VI	0	0	30	0	30	1	100	-	100
1	24CBP64	Mini Project	VI	0	0	60	0	60	2	60	40	100
11	24CBP71	Project Work Phase – I	VII	0	0	60	0	60	2	60	40	100
12	24CBP81	Project Work Phase – II	VIII	0	0	240	0	240	8	60	40	100
<b>TOTAL</b>				<b>0</b>	<b>0</b>	<b>540</b>	<b>30</b>	<b>570</b>	<b>21</b>			

  
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PROFESSIONAL CORE COURSES (PCC)												
S. No.	Course Code	Course Title	Semester	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
1	24CST29	Python Programming	II	45	0	0	45	90	3	40	60	100
2	24CST21	Design Thinking	II	30	0	0	30	60	2	40	60	100
3	24CSP29	Python Programming Laboratory	II	0	0	30	0	30	1	60	40	100
4	24CBT31	Operating Systems and security	III	45	0	0	45	90	3	40	60	100
5	24CBT36	Data Structures and Algorithms	III	45	0	0	45	90	3	40	60	100
6	24CBT33	Programming in JAVA	III	45	0	0	45	90	3	40	60	100
7	24CST38	Computer Organization and Architecture	III	45	0	0	45	90	3	40	60	100
8	24CBP31	Operating Systems and security Laboratory	III	0	0	45	0	45	1.5	60	40	100
9	24CBP37	Data Structures and Algorithms Laboratory	III	0	0	45	0	45	1.5	60	40	100
10	24CBP33	Programming in JAVA Laboratory	III	0	0	45	0	45	1.5	60	40	100
11	24CBP36	Design Studio-I	III	0	0	30	0	30	1	60	40	100
12	24ITT46	Database Management Systems	IV	45	0	0	45	90	3	40	60	100
13	24CST46	Design and Analysis of Algorithms	IV	45	0	0	45	90	3	40	60	100
14	24CST41	Cryptography	IV	45	0	0	45	90	3	40	60	100
15	24CBI36	Advanced JAVA Programming	IV	15	0	90	15	120	4	50	50	100
16	24CSP46	Design and Analysis of Algorithms Laboratory	IV	0	0	60	0	60	2	60	40	100
17	24ITP46	Database Management Systems Laboratory	IV	0	0	60	0	60	2	40	60	100
18	24CSP47	Design Studio-II	IV	0	0	30	0	30	1	60	40	100
19	24ITT56	Computer Networks	V	45	0	0	45	90	3	40	60	100
20	24CBT51	Automata and Compiler Design	V	45	30	0	45	120	4	40	60	100
21	24ECT56	Microprocessors and Microcontrollers	V	45	0	0	45	90	3	40	60	100
22	24CBI51	Artificial Intelligence	V	45	0	30	45	120	4	50	50	100
23	24CBI52	Ethical Hacking	V	45	0	30	45	120	4	50	50	100
24	24ITP56	Computer Networks Laboratory	V	0	0	45	0	45	1.5	60	40	100
25	24ECP56	Microprocessors and Microcontrollers Laboratory	V	0	0	45	0	45	1.5	60	40	100
26	24CBT61	Penetration Testing and Vulnerability Assessment	VI	45	0	0	45	120	3	40	60	100
27	24CBP61	Penetration Testing and Vulnerability Assessment Laboratory	VI	0	0	45	0	45	1.5	60	40	100
28	24CBT71	Malware Analysis	VII	45	0	0	45	90	3	40	60	100
29	24CBT72	Standards in Computer Science and Engineering	VII	15	0	0	15	30	1	100	-	100
<b>TOTAL</b>				<b>735</b>	<b>30</b>	<b>630</b>	<b>735</b>	<b>2160</b>	<b>71</b>			

  
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<u>VERTICAL 1</u>	<u>VERTICAL 2</u>	<u>VERTICAL 3</u>	<u>VERTICAL 4</u>	<u>VERTICAL 5</u>	<u>VERTICAL 6</u>
Cloud Security Engineer	SOC Analyst	GRC Analyst	Incident Response Analyst	Application Security Engineer	Full Stack Developer
Cloud Security	Cybersecurity & Threat Landscape	Information Security Governance	Incident Response & Cyber Crisis Management	Secure Software Engineering	Frontend Development
Identity & Access Management	Security Operations & SIEM	Risk Assessment & Management	Threat Hunting	Application Security Testing	Backend Development
Container & Kubernetes Security	Network Security & Monitoring	Security Policies & Compliance Frameworks	Reverse Engineering	Secure SDLC & Threat Modeling	API Design & Integration
DevSecOps & CI/CD Security	Incident Detection & Response	Security Auditing & Assurance	SOC Automation	Secure API and Microservices Security	Software Testing & Debugging
Automation & Security Orchestration	Thread Intelligence & Threat Hunting	Cyber law & Data Privacy	Root Cause Analysis & Incident Reporting	Software Vulnerability Management	Deployment & DevOps
Cloud Compliance & Risk Management	Security Frameworks & Compliance	Compliance Standards & Regulations	Business Continuity & Disaster Recovery	Secure Coding Practices	Web Application Security

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S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>VERTICAL 1: CLOUD SECURITY ENGINEER</b>												
1.	24CBE01	Cloud Security	PEC	45	0	0	45	90	3	40	60	100
2.	24CBE02	Identity & Access Management	PEC	45	0	0	45	90	3	40	60	100
3.	24CBE03	Container & Kubernetes Security	PEC	45	0	0	45	90	3	40	60	100
4.	24CBE04	DevSecOps & CI/CD Security	PEC	45	0	0	45	90	3	40	60	100
5.	24CBE05	Automation & Security Orchestration	PEC	45	0	0	45	90	3	40	60	100
6.	24CBE06	Cloud Compliance & Risk Management	PEC	45	0	0	45	90	3	40	60	100
<b>VERTICAL 2: SOC ANALYST</b>												
1.	24CBE07	Cybersecurity & Threat Landscape	PEC	45	0	0	45	90	3	40	60	100
2.	24CBE08	Security Operations & SIEM	PEC	45	0	0	45	90	3	40	60	100
3.	24CBE09	Network Security & Monitoring	PEC	45	0	0	45	90	3	40	60	100
4.	24CBE10	Incident Detection & Response	PEC	45	0	0	45	90	3	40	60	100
5.	24CBE11	Thread Intelligence & Threat Hunting	PEC	45	0	0	45	90	3	40	60	100
6.	24CBE12	Security Frameworks & Compliance	PEC	45	0	0	45	90	3	40	60	100
<b>VERTICAL 3: GRC ANALYST</b>												
1.	24CBE13	Information Security Governance	PEC	45	0	0	45	90	3	40	60	100
2.	24CBE14	Risk Assessment & Management	PEC	45	0	0	45	90	3	40	60	100
3.	24CBE15	Security Policies & Compliance Frameworks	PEC	45	0	0	45	90	3	40	60	100
4.	24CBE16	Security Auditing & Assurance	PEC	45	0	0	45	90	3	40	60	100
5.	24CBE17	Cyber law & Data Privacy	PEC	45	0	0	45	90	3	40	60	100
6.	24CBE18	Compliance Standards & Regulations	PEC	45	0	0	45	90	3	40	60	100
<b>VERTICAL4: INCIDENT RESPONSE ANALYST</b>												
1.	24CBE19	Incident Response & Cyber Crisis Management	PEC	45	0	0	45	90	3	40	60	100
2.	24CBE20	Threat Hunting	PEC	45	0	0	45	90	3	40	60	100
3.	24CBE21	Reverse Engineering	PEC	45	0	0	45	90	3	40	60	100
4.	24CBE22	SOC Automation	PEC	45	0	0	45	90	3	40	60	100
5.	24CBE23	Root Cause Analysis & Incident Reporting	PEC	45	0	0	45	90	3	40	60	100
6.	24CBE24	Business Continuity & Disaster Recovery	PEC	45	0	0	45	90	3	40	60	100

  
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S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>VERTICAL 5: APPLICATION SECURITY ENGINEER</b>												
1.	24CBE25	Secure Software Engineering	PEC	45	0	0	45	90	3	40	60	100
2.	24CBE26	Application Security Testing	PEC	45	0	0	45	90	3	40	60	100
3.	24CBE27	Secure SDLC & Threat Modeling	PEC	45	0	0	45	90	3	40	60	100
4.	24CBE28	Secure API and Microservices Security	PEC	45	0	0	45	90	3	40	60	100
5.	24CBE29	Software Vulnerability Management	PEC	45	0	0	45	90	3	40	60	100
6.	24CBE30	Secure Coding Practices	PEC	45	0	0	45	90	3	40	60	100
<b>VERTICAL 6: FULL STACK DEVELOPER</b>												
1.	24CBE31	Frontend Development	PEC	45	0	0	45	90	3	40	60	100
2.	24CBE32	Backend Development	PEC	45	0	0	45	90	3	40	60	100
3.	24CBE33	API Design & Integration	PEC	45	0	0	45	90	3	40	60	100
4.	24CBE34	Software Testing & Debugging	PEC	45	0	0	45	90	3	40	60	100
5.	24CBE35	Deployment & DevOps	PEC	45	0	0	45	90	3	40	60	100
6.	24CBE36	Web Application Security	PEC	45	0	0	45	90	3	40	60	100

S. No.	Course Code	Course Title	Category	Periods per Sem					Credit C=T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>MANDATORY COURSE – I&amp; II</b>												
1	24MCP09	Yoga for Stress Management	MC	0	0	30	0	30	0	-	-	-
2	24MCT01	Constitution of India	MC	15	0	0	15	30	0	100	-	100
3	24MCT02	Environmental Science and sustainability	MC	15	0	0	15	30	0	100	-	100
4	24MCT03	Introduction to Gender Studies	MC	15	0	0	15	30	0	100	-	100
5	24MCT04	Life Science for Engineers	MC	15	0	0	15	30	0	100	-	100
6	24MCT05	Industrial safety	MC	15	0	0	15	30	0	100	-	100
7	24MCT06	Essence of Indian Traditional Knowledge	MC	15	0	0	15	30	0	100	-	100
8	24MCT07	Elements of Literature	MC	15	0	0	15	30	0	100	-	100
9	24MCT08	Disaster Management	MC	15	0	0	15	30	0	100	-	100

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S. No.	Course Code	Course Title	Category	Periods / Semester					C= T/30	Max. Marks		
				L	T	P	SL	Tot		CA	ES	Tot
<b>OPEN ELECTIVE DETAILS</b>												
<b>AUTOMOBILE ENGINEERING</b>												
1	24AU001	Basics of Automobile Engineering	OEC	45	0	0	45	90	3	40	60	100
2	24AU002	Hybrid Vehicles	OEC	45	0	0	45	90	3	40	60	100
<b>BIO-MEDICAL ENGINEERING</b>												
3	24BMO01	Basics of Biomedical Instrumentation	OEC	45	0	0	45	90	3	40	60	100
4	24BMO02	Biometric systems	OEC	45	0	0	45	90	3	40	60	100
<b>CIVIL ENGINEERING</b>												
5	24CEO01	Smart Buildings	OEC	45	0	0	45	90	3	40	60	100
6	24CEO02	Climate Change	OEC	45	0	0	45	90	3	40	60	100
<b>COMPUTER SCIENCE AND ENGINEERING</b>												
7	24CSO01	Data structures and Algorithms using C	OEC	45	0	30	45	120	4	40	60	100
8	24CSO02	Fundamentals of Java Programming	OEC	15	0	90	15	120	4	40	60	100
9	24CSO03	Full Stack Framework	OEC	45	0	0	45	90	3	40	60	100
10	24CSO04	Digital Marketing	OEC	45	0	0	45	90	3	40	60	100
<b>COMPUTER SCIENCE AND ENGINEERING (IoT)</b>												
11	24IOO01	Industrial Internet of Things	OEC	45	0	0	45	90	3	40	60	100
12	24IOO02	Introduction to Sensors and IoT	OEC	45	0	0	45	90	3	40	60	100
<b>COMPUTER SCIENCE AND ENGINEERING (Cyber Security)</b>												
13	24CBO01	Ethical Hacking	OEC	45	0	0	45	90	3	40	60	100
14	24CBO02	Digital and Mobile Forensics	OEC	45	0	0	45	90	3	40	60	100
15	24CBO03	Applied Java Programming	OEC	15	0	90	15	120	4	50	50	100
<b>ARTIFICIAL INTELLIGENCE AND DATA SCIENCE</b>												
16	24CSO06	Data Science Fundamentals	OEC	45	0	0	45	90	3	40	60	100
17	24CSO07	Artificial Intelligence and Machine learning	OEC	45	0	0	45	90	3	40	60	100
18	24CSO08	Data Exploration and Visualization	OEC	45	0	0	45	90	3	40	60	100
<b>ELECTRONICS AND COMMUNICATION ENGINEERING</b>												
19	24ECO01	Drone Technology	OEC	45	0	0	45	90	3	40	60	100
20	24ECO02	Wearable Devices	OEC	45	0	0	45	90	3	40	60	100
21	24ECO03	5G /6G Communication	OEC	45	0	0	45	90	3	40	60	100
22	24ECO04	Embedded IoT	OEC	45	0	0	45	90	3	40	60	100
<b>ELECTRICAL AND ELECTRONICS ENGINEERING</b>												
23	24EEO01	Solar and Wind Energy System	OEC	45	0	0	45	90	3	40	60	100

24	24EEO02	Hydrogen and Hybrid Energy System	OEC	45	0	0	45	90	3	40	60	100
25	24EEO03	Electric Vehicle Technology	OEC	45	0	0	45	90	3	40	60	100
26	24EEO04	Energy Conservation and Management	OEC	45	0	0	45	90	3	40	60	100
<b>INFORMATION TECHNOLOGY</b>												
27	24ITO01	Introduction to Mobile Application Development	OEC	45	0	0	45	90	3	40	60	100
28	24ITO02	Introduction to Big Data and Analytics	OEC	45	0	0	45	90	3	40	60	100
29	24ITO03	Augmented Reality / Virtual Reality	OEC	45	0	0	45	90	3	40	60	100
<b>MECHANICAL ENGINEERING</b>												
30	24MEO01	3D Printing	OEC	45	0	0	45	90	3	40	60	100
31	24MEO02	Robotics and Automation	OEC	45	0	0	45	90	3	40	60	100
32	24MEO03	Lean Manufacturing	OEC	45	0	0	45	90	3	40	60	100
<b>SAFETY AND FIRE ENGINEERING</b>												
33	24SFO01	Occupational Health and Safety	OEC	45	0	0	45	90	3	40	60	100
34	24SFO02	Electrical Safety	OEC	45	0	0	45	90	3	40	60	100
35	24SFO03	Building Fire Safety	OEC	45	0	0	45	90	3	40	60	100
36	24SFO04	Construction Safety	OEC	45	0	0	45	90	3	40	60	100

Summary										
Name of the Programme: B.E Computer Science and Engineering (Cyber security)										
CATEGORY	I	II	III	IV	V	VI	VII	VIII	TOTAL CREDITS	%
HSMC	4	2	-	-	-	6	-	-	12	7.36
BSC	8	8	4	4	-	-	-	-	24	14.72
ESC	10	4	-	-	-	-	-	-	14	8.59
PCC	-	6	17.5	18	21	4.5	4	-	71	43.56
PEC	-	-	-	-	3	6	9	-	18	11.04
OEC	-	-	-	-	-	-	3	-	3	1.84
EEC	1	1	1	1	3	4	2	8	21	12.88
MC	-	✓	-	-	✓	✓	-	-	-	-
<b>Total</b>	<b>23</b>	<b>21</b>	<b>22.5</b>	<b>23</b>	<b>27</b>	<b>20.5</b>	<b>18</b>	<b>8</b>	<b>163</b>	<b>100</b>

Total No.Of Credits=163

Total No.Of.Credit for Lateral Entry Students=119

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24ENT19	PROFESSIONAL COMMUNICATION	Category	L	T	P	SL	C
		HSMC	45	0	0	45	3
<b>(Common to All Branches)</b>							
<b>PRE-REQUISITE:</b> A comprehensive understanding of basic English grammar, vocabulary, and sentence structure with familiarity in Communication and Technical Writing are considered as pre-requisite for the course.							
<b>OBJECTIVE:</b> To equip learners with essential verbal and written communication skills, including technical writing, necessary for academic, professional, and workplace success.							
<b>UNIT - I</b>	<b>UNDERSTANDING COMPARISONS AND CONTRASTS</b>	<b>(9)</b>					
<b>Reading:</b> Technical brochures, telephone messages, social media messages. <b>Writing:</b> Emails/letters introducing oneself, Compare and Contrast Essay. <b>Grammar:</b> Present Tenses, Framing WH and Yes-No questions. <b>Vocabulary:</b> Portmanteau words, One-word substitutions.							
<b>UNIT - II</b>	<b>WRITING REPORTS AND PARAGRAPHS</b>	<b>(9)</b>					
<b>Reading:</b> Technical texts, biographies, travelogues, travel & technical blogs. <b>Writing:</b> Paragraph writing, Short Report on an event/industrial visit. <b>Grammar:</b> Past Tenses, Active & Passive Voice transformations, Prepositions. <b>Vocabulary:</b> Word formations using Prefixes & Suffixes.							
<b>UNIT - III</b>	<b>DESCRIBING THE PROCESS/PRODUCT</b>	<b>(9)</b>					
<b>Reading:</b> Advertisements, gadget reviews, user manuals, news reports. <b>Writing:</b> Definitions, Instructions, Product/Process description, Checklists. <b>Grammar:</b> Future Tenses, If clauses, Concord. <b>Vocabulary:</b> Nominal Compounds, Discourse Markers (connectives & sequence words).							
<b>UNIT - IV</b>	<b>TRANSCODING AND RECOMMENDATIONS</b>	<b>(9)</b>					
<b>Reading:</b> Newspaper articles, Journal reports. <b>Writing:</b> Recommendations, Transcoding.(Conversion of non-verbal to verbal information) <b>Grammar:</b> Articles, Relative pronouns, Modals. <b>Vocabulary:</b> Collocations, Homonyms.							
<b>UNIT - V</b>	<b>SUMMATION AND DESCRIPTION</b>	<b>(9)</b>					
<b>Reading:</b> Editorials and Opinion blogs, Company profiles. <b>Writing:</b> Descriptive/Narrative Essays, Job/Internship Application with Resume. <b>Grammar:</b> Numerical adjectives, Relative Clauses. <b>Vocabulary:</b> Cause & Effect Expressions, Homophones.							
<b>TOTAL (T:45 , SL:45) = 90 PERIODS</b>							

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**COURSE OUTCOMES:**

At the end of the course, the learners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Recognize the structure of comparison texts using correct tenses and appropriate vocabulary.	Understand
CO2	Construct short paragraphs and reports using past tense and clear expressions.	Understand
CO3	Comprehend processes and products using future forms and appropriate vocabulary.	Understand
CO4	Interpret visuals like charts or graphs to produce well-structured written content.	Understand
CO5	Draft essays and job applications clearly, using proper grammar and structure.	Understand

**TEXT BOOKS:**

1. English for Engineers & Technologists, Orient Blackswan Private Ltd. Department of English, Anna University, 2023.
2. Nitin Bhatnagar, Communicative English for Engineers and Professionals, Pearson, 2024.

**REFERENCES:**

1. Dr. K.N. Shoba, and Dr. Lourdes Jovani, English for Science & Technology-II Cambridge University Press. Francis, Department of English, Anna University, 2023.
2. Lakshminarayanan, A Course Book on Technical English, Scitech Publications (India) Pvt. Ltd.2022.
3. Kulbhusan Kumar, RS Salaria, Effective Communication Skill, Khanna Publishing House, 2023.

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	3	-	3	-	-
CO2	-	-	-	-	-	-	-	2	3	-	3	-	-
CO3	-	-	-	-	-	-	-	2	3	-	3	-	-
CO4	-	-	-	-	-	-	-	2	3	-	3	-	-
CO5	-	-	-	-	-	-	-	2	3	-	3	-	-

1-Low, 2-Medium, 3-High

  
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24EET06	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	Category	L	T	P	SL	C
		ESC	45	0	0	45	3
(Common to AE, BME, CSE, CSE (CS), CSD, CSE (IoT), IT, MECH, SFE)							
<b>PREREQUISITE:</b> Basic knowledge of calculus, differential equations, and physics (especially electromagnetism) with strong problem-solving skills for circuit analysis.							
<b>OBJECTIVE:</b> <ul style="list-style-type: none"> <li>To introduce the fundamentals of electrical and electronic systems, enabling analysis and application of basic circuits, machines and digital components.</li> </ul>							
<b>UNIT - I</b>	<b>DC AND AC CIRCUITS</b>	<b>(9)</b>					
<b>DC circuits:</b> Electrical quantities – Ohm's law – Kirchhoff's current and voltage laws – Series and parallel resistors – Simple problems. <b>AC circuits:</b> Waveforms, average value, RMS value, form factor, peak factor, power and power factor – Pure R, L and C – Series RL and RC circuits.							
<b>UNIT - II</b>	<b>ELECTRICAL MACHINES</b>	<b>(9)</b>					
DC machine: construction, working principle and applications – Single phase induction motor: Capacitor start capacitor run induction motor – Three phase induction motor: construction and working principle – Single phase transformer: construction and working principle.							
<b>UNIT - III</b>	<b>ELECTRICAL INSTALLATIONS</b>	<b>(9)</b>					
Classification of wiring system – Earthing – Types: pipe earthing, plate earthing, strip earthing – On-line and Off-line UPS – Lamps: Fluorescent tube, LED.							
<b>UNIT - IV</b>	<b>ANALOG ELECTRONICS</b>	<b>(9)</b>					
PN junction diode and Zener diode: Principle of operation and V-I characteristics – Half and full wave rectifier – Bipolar Junction Transistor: Construction and working.							
<b>UNIT - V</b>	<b>DIGITAL ELECTRONICS</b>	<b>(9)</b>					
Digital logic gates: NOT, AND, OR, NAND, NOR, EXOR – Digital circuits: half-adder, full-adder, JK and D flip flop – Introduction to Arduino components and IDE.							
<b>LECTURE = 45, SELF LEARNING = 45, TOTAL = 90 PERIODS</b>							

  
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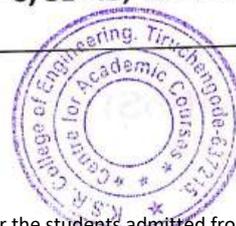
COURSE OUTCOMES:														
Upon completion of the course, the students will be able to:														
COs	Course Outcome												Bloom's Taxonomy Level	
CO1	Interpret the fundamental concepts of electrical circuits to solve the DC and AC circuit problems.												Understand	
CO2	Elaborate the construction and working principles of DC machines, induction motors and transformers.												Understand	
CO3	Describe the wiring systems, earthing techniques and the functionality of UPS and lighting systems.												Understand	
CO4	Identify the operation and characteristics of PN junction, Zener diode and BJT.												Understand	
CO5	Illustrate the functionality of digital logic gates, adders, flip-flops and Arduino components.												Understand	
TEXT BOOKS:														
1 Kothari D.P and Nagrath I.J, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill, Uttar Pradesh, 2020.														
2 Bhattacharya S.K, "Basic Electrical and Electronics Engineering", Pearson Education, Delhi, Second Edition, 2017.														
REFERENCES:														
1 Jain V.K, Amitabh Bajaj, "Design of Electrical Installation", University Science Press, New Delhi, 2016.														
2 Ramamoorthy M, Chandra Sekhar O, "Electrical Machines", PHI Learning Pvt. Ltd, Delhi, 2018.														
3 Christopher Siu, "Electronic Devices, Circuits, and Applications", Springer International Publishing, 2022.														
4 Kothari D.P, Dhillon J.S, "Digital Circuits & Design", First Edition, Pearson, Delhi, 2015.														
Mapping of COs with POs and PSOs														
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	2	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	2	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	2	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	2	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	2	-	-

  
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24ITT16	PROGRAMMING FOR PROBLEM SOLVING	Category	L	T	P	SL	C
		ESC	45	0	0	45	3
<b>(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE)</b>							
<b>PREREQUISITE:</b>							
Students must have basic computer literacy, including familiarity with operating systems, file management, and software usage. A Basic understanding of algorithms and flowcharts are required to design and visualize problem solving strategies. Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.							
<b>OBJECTIVES:</b>							
The course introduces fundamental programming concepts using the C language, covering computer organization, algorithm representation, and basic syntax. Students will learn control structures, functions, arrays, pointers, and string handling. The course also covers complex data types like structures and unions, storage classes, and file operations. By the end, students will be able to analyze problems, design algorithms, and implement solutions using C programming.							
<b>UNIT - I</b>	<b>INTRODUCTION TO COMPUTING AND C</b>						<b>(9)</b>
Introduction to Computing: Organization of computer – Hardware and Software – Number system and Conversions – Representation of an algorithm: pseudo code, flowchart with examples. Introduction to C –features of C – Structure of C program – Character set – C tokens – Keywords – Identifiers – Constants – Variables – Data types – Operators – Precedence and Associativity.							
<b>UNIT - II</b>	<b>CONTROL STRUCTURES</b>						<b>(9)</b>
Decision Making and Branching: Introduction – decision making with if statement – simple if statement – if-else statement – nested if-else statements – if-else-if ladder statement – switch statement – goto statement – conditional operator – Decision making and looping: Introduction – while statement – do-while statement – for statement.							
<b>UNIT - III</b>	<b>FUNCTIONS AND ARRAY</b>						<b>(9)</b>
Functions: Declaration and definition – Function prototype – parameter and arguments – Return type – passing argument by value and by reference – Function scope and lifetime – Function pointer – Arrays: array declaration and initialization – One dimensional array and Two dimensional array with example.							
<b>UNIT - IV</b>	<b>POINTERS AND STRINGS</b>						<b>(9)</b>
Pointers: Definition – Initialization – Pointer's arithmetic – Pointers to pointers – Pointers and arrays. String: Declaring and initializing string variables – String handling functions and operations.							
<b>UNIT - V</b>	<b>STRUCTURE, UNION AND FILE</b>						<b>(9)</b>
Structures: Declaration – Definition – Structure within a structure – Union – Storage classes – Preprocessor directives – Files: Defining and opening a file – Closing a file – input/output operations on files – Command line arguments.							
<b>L= 45, T=0, P=0, SL=45, TOTAL: 90 PERIODS</b>							

*S. Gangaiah*  
**Chairman (BoS)**  
 K.S.R. College of Engineering



**COURSE OUTCOMES:**

At the end of the course, the learners will be able to:

COs	Course Outcome	Cognitive Level
CO1	Discuss about number systems and perform conversions between different number systems and depict about basic structure of C program.	Understand
CO2	Apply the concept of Looping and conditional statements to solve real-world programming problems efficiently. .	Apply
CO3	Develop modular programs using functions and implement single and two-dimensional arrays for efficient data storage and manipulation.	Apply
CO4	Apply pointer concepts with arrays and functions, and develop efficient C programs using string operations for effective memory management and text processing.	Apply
CO5	Implement user-defined data types using structures and unions, manage memory with storage classes and perform file operations and command-line processing in C programs.	Apply

**TEXT BOOKS:**

- Herbert Schildt, C - The Complete Reference, Tata McGraw-Hill, New Delhi, Fourth Edition, 2017.
- Byron S Gottfried and Jitendar Kumar Chhabra, "Programming with C", Tata McGraw Hill Publishing Company, Third Edition, 2011.

**REFERENCES:**

- Yashavant Kanetkar, "Let Us C: Authentic guide to C programming language", BPB Publication, 19th Edition, 2022.
- Robert C. Seacord, "Effective C", No Starch Press, 2020.
- E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.
- Ashok N.Kamathane, 'Computer Programming, Pearson Education, India, Third Edition ,2015.
- <https://archive.nptel.ac.in/courses/106/105/106105171/>

**Mapping of COs with POs and PSOs**

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

1-low, 2-medium, 3-high

  
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24GET19	தமிழர்மரபு	CATEGORY	L	T	P	SL	C
		HSMC	15	0	0	15	1
<b>(அனைத்து துறைகளுக்கும் பொதுவானது)</b>							
முன்கூட்டிய துறைசார் அறிவு : தேவை இல்லை							
அலகு - I	மொழி மற்றும் இலக்கியம்						[03]
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலயக்கிகியங்கள் - சங்க இலக்கியத்தின் சமயச்சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள், தமிழகத்தில் சமணபௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலகியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கியவளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.							
அலகு - II	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை						[03]
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனியில் திருவள்ளுவர் சிலை - இசை கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூகபொருளாதார வாழ்வில் கோவில்களின் பங்கு.							
அலகு - III	நாட்டுப் புறக் கலைகள் மற்றும் வீர விளையாட்டுக்கள்						[03]
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.							
அலகு - IV	தமிழர்களின் திணைக் கோட்பாடுகள்						[03]
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்கக்காலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி.							
அலகு - V	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு						[03]
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறபகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்தமருத்துவத்தின் பங்கு கல்வெட்டுகள் கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்கள்களின் அச்ச வரலாறு.							
Total (L= 15, SL=15)=30 Periods							

  
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<b>பாடம் கற்றத்தின் விளைவுகள்: பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்</b>		<b>அறிவாற்றல் நிலை</b>
CO1:	தமிழ்மொழியின் செந்தன்மை மற்றும் இலக்கியம் குறித்த தெரிதல்	புரிதல்
CO2:	தமிழர்களின் சிற்பக்கலை, ஓவியக்கலை மற்றும் இசைக் கருவிகள் குறித்த தெளிவு.	புரிதல்
CO3:	தமிழர்களின் நாட்டுப் புரைக் கலைகள் மற்றும் வீரவிளையாட்டுகள் குறித்த தெளிவு	புரிதல்
CO4:	தமிழர்களின் திணைக் கோட்பாடுகள், சங்ககாலவணிகம் மற்றும் சோழர்களின் வெற்றிகள் குறித்த தகவல்கள்.	புரிதல்
CO5:	இந்திய தேசிய இயக்கம், சுயமரியாதை இயக்கம் மற்றும் சித்த மருத்தவம் பற்றிய புரிதல்.	புரிதல்

**Text Books:**

1	தமிழகவரலாறு-மக்களும்பண்பாடும்-கேகேபிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்) ,உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை, 2002
2	கணினித்தமிழ்முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016

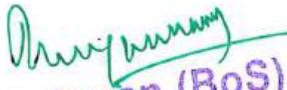
**Reference Books :**

1	கீழடி-வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.(தொல்லியல்துறைவெளியீடு)
2	பொருளை - ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
3	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
4	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).

**Mapping of COs with POs and PSOs**

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

1. சிறிது (குறைந்த) 2. மிதமான (நடுத்தர) 3. கணிசமான (உயர்)

  
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24GET19	HERITAGE OF TAMILS	CATEGORY	L	T	P	SL	C
		HSMC	15	0	0	15	1
(Common to all branches)							
<i>Prerequisite(s): No prerequisites are needed for enrolling into the course</i>							
UNIT - I	LANGUAGE AND LITERATURE					[03]	
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.							
UNIT - II	HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE					[03]	
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, Yash and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.							
UNIT - III	FOLK AND MARTIAL ARTS					[03]	
Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.							
UNIT - IV	THINAI CONCEPT OF TAMILS					[03]	
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					[03]	
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.							
<b>Total (L= 15, SL=15) =30 Periods</b>							
<b>Course Outcomes:</b>						<b>Cognitive Level</b>	
<b>At the end of the course, the student will be able to</b>							
CO1:	Recognize the extensive literature of Tamil and its classical nature.					Understand	
CO2:	Apprehend the heritage of sculpture, painting and musical instruments of ancient people.					Understand	
CO3:	Review on folk and martial arts of Tamil people.					Understand	
CO4:	Insight thinai concepts, trade and victory of Chozha dynasty.					Understand	
CO5:	Realize the contribution of Tamil in Indian freedom struggle, self-esteem movement and siddha medicine.					Understand	

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Chairman (BoS)



Text Books:	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
Reference Books:	
1	Social Life of the Tamils – The. Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
2	The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Puplished by International Institute of Tamil Studies).
3	Keeladi – ‘Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
4	Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)													

*Arumugam*  
Chairman (BoS)



24MAI19	MATRICES AND CALCULUS	Category	L	T	P	SL	C
		BSC	30	15	30	45	4
<b>SEMESTER I - B.E / B.TECH ( Common to All Branches )</b>							
<b>PREREQUISITE</b>							
The Students should have a basic understanding of calculus, matrices, and differential equations to effectively follow the concepts in this course.							
<b>OBJECTIVES:</b>							
Build a strong foundation in eigen values, eigen vectors, quadratic forms, and higher-order linear differential equations. Develop skills in differential and vector calculus to analyze curves, optimize multivariable functions, and interpret vector fields.							
<b>UNIT - I</b>	<b>LINEAR ALGEBRA</b>						<b>(9)</b>
Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (Excluding proof) – Cayley Hamilton theorem (excluding proof) – Quadratic forms – Reduction of quadratic form to canonical form by orthogonal transformation.							
<b>UNIT - II</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS</b>						<b>(9)</b>
Linear differential equations of second and higher order with constant coefficients – Differential equations with variable coefficients – Cauchy’s and Legendre’s linear equations – Method of variation of parameters.							
<b>UNIT - III</b>	<b>DIFFERENTIAL CALCULUS</b>						<b>(9)</b>
Curvature - Radius of curvature (Cartesian co-ordinates only) – Centre of curvature and Circle of curvature – Involute and Evolute (Parabola, Ellipse, Hyperbola and Rectangular hyperbola ).							
<b>UNIT - IV</b>	<b>FUNCTIONS OF SEVERAL VARIABLES</b>						<b>(9)</b>
Partial derivatives – Euler’s theorem for homogenous functions – Taylor’s series expansion - Maxima and Minima for functions of two variables – Method of Lagrangian multipliers.							
<b>UNIT - V</b>	<b>VECTOR CALCULUS</b>						<b>(9)</b>
Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Green’s theorem in plane, Gauss divergence theorem and Stoke’s theorem (Cube, Cuboid and Rectangular Paralleopiped only).							
<b>List of Exercise/Experiments(MAT LAB):</b>							
<ol style="list-style-type: none"> <li>1. Calculate the characteristic equation and eigenvalues</li> <li>2. Find the eigenvector and diagonalization of a given matrix.</li> <li>3. Solving ODE with constant coefficients</li> <li>4. Detect the solution of ODE with variable coefficients</li> <li>5. Identify the radius of curvature</li> <li>6. Establish the Evolute of curve.</li> <li>7. Reckon the Taylor’s series for functions of two variables.</li> <li>8. Compute the maxima and minima.</li> <li>9. Estimate the directional derivative, divergence and curl.</li> <li>10. Determine line integral, surface integral and volume integral.</li> </ol>							
<b>L = 30 , T = 15 &amp; P = 30 &amp; SL = 45, TOTAL: 120 PERIODS</b>							

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**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Apply eigen values, eigen vectors, and the Cayley-Hamilton theorem to solve matrix problems and diagonalize quadratic forms into canonical form.	Apply
CO2	Apply methods to solve second and higher-order linear differential equations with constant and variable coefficients.	Apply
CO3	Apply concepts of differential calculus to find curvature, center of curvature, and evolutes of standard Cartesian conic sections.	Apply
CO4	Apply partial derivatives, Jacobians, and lagrangian multipliers to determine local extremum of multivariable functions.	Apply
CO5	Apply vector differential operators to the vector fields and verify Green's, Gauss divergence, and Stokes' theorems for geometries.	Apply

**TEXT BOOKS:**

1. Ravish R Singh and Mukul Bhatt, "Engineering Mathematics – I", Mc-Graw Hill Publications, New Delhi, 2<sup>nd</sup> Edition, 2020.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40<sup>th</sup> Edition, 2020.

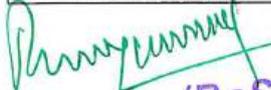
**REFERENCES:**

1. Bali N. P and Manish Goyal, "Engineering Mathematics", Laxmi Publications Pvt Ltd., 7<sup>th</sup> Edition, 2020.
2. Dass H.K, "Advance Engineering Mathematics", S. Chand and company, 11<sup>th</sup> Edition, 2014.
3. Jain R.K. and Iyengar S.R.K, "Advanced Engineering Mathematics", Narosa Publications, 8<sup>th</sup> Edition, 2012.
4. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India, New Delhi, 10<sup>th</sup> Edition 2016.
5. <https://archive.nptel.ac.in/courses/111/108/111108157/>
6. <https://archive.nptel.ac.in/courses/111/105/111105122/>

**Mapping of COs with POs and PSOs**

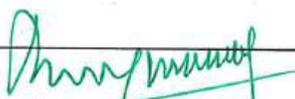
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	-	-	1	-	-	2	-	-
CO2	3	3	3	3	2	-	-	1	-	-	2	-	-
CO3	3	3	3	3	2	-	-	1	-	-	2	-	-
CO4	3	3	3	3	2	-	-	1	-	-	2	-	-
CO5	3	3	3	3	2	-	-	1	-	-	2	-	-
Avg.	3	3	3	3	2	0	0	1	0	0	2	0	0

1-low, 2-medium, 3-high

  
Chairman (BoS)



24CHI06	CHEMISTRY FOR ENGINEERS	Category	L	T	P	SL	C
		BSC	45	0	30	45	4
<b>(Common to AI&amp;DS, BME, CSE, CSE(CS), CSE(CSD), CSE(IoT), ECE, EEE and IT)</b>							
<b>PREREQUISITE</b>							
The students must have knowledge about the basic concepts of water parameters, electro chemistry, organic reactions and their applications.							
<b>OBJECTIVES:</b>							
To equip the learners to apply the chemical principles and their applications in the engineering fields.							
<b>UNIT - I</b>	<b>WATER TREATMENT</b>						<b>(9)</b>
Hardness – types, units – estimation of hardness by EDTA method; Boiler feed water – requirements, disadvantages of using hard water in boilers – scale and sludge – priming and foaming – caustic embrittlement – boiler corrosion. Softening methods – internal conditioning – calgon, phosphate – external conditioning – zeolite process and ion exchange process; Desalination – reverse osmosis. Domestic water treatment (Sterilisation process Only).							
<b>UNIT - II</b>	<b>ELECTROCHEMISTRY AND CORROSION</b>						<b>(9)</b>
Introduction – electrode potential – Nernst equation – EMF series and its significance; E – Vehicles - Need - Types – Advantages and Disadvantages; Corrosion – causes, consequences – classification – chemical corrosion – electro chemical corrosion – mechanism; Galvanic & differential aeration corrosion – factors influencing corrosion – corrosion control (Sacrificial anode and Impressed Current Cathodic protection method).							
<b>UNIT - III</b>	<b>ENERGY STORAGE DEVICES</b>						<b>(9)</b>
Batteries – primary battery – Dry cell, secondary batteries – lead-acid and lithium-ion batteries. Fuel cells – H <sub>2</sub> -O <sub>2</sub> fuel cell, solar cells – principle, applications and advantages; Nuclear energy: Light water Nuclear power plant - breeder reactor.							
<b>UNIT - IV</b>	<b>POLYMER CHEMISTRY</b>						<b>(9)</b>
Polymer – definition – degree of polymerization – functionality. Polymerization – addition, condensation and co-polymerization – free radical mechanism of addition polymerization; Preparation properties & uses of PVC, Nylon – 6,6 & Teflon. Plastics – classification – thermosetting and thermoplastics. Fabrication of polymers – compression and Injection moulding.							
<b>UNIT - V</b>	<b>NANO CHEMISTRY AND COMPOSITES</b>						<b>(9)</b>
Introduction – basics of nanochemistry – distinction between nanoparticles, molecules and bulk materials - synthesis of nanomaterials [CVD, laser evaporation, pyrolysis] - applications of nanomaterials. Composite – Introduction: Definition and need for composite – Types of composites: Properties and application of FRP and MMC.							
<b>List of Exercise/Experiments:</b>							
1. Estimation of total, permanent and temporary hardness of water sample By EDTA method							
2. Estimation of chloride content in water by Argentometric method [Mohr's Method]							
3. Conductometric titration of strong acid with strong base (HCl Vs NaOH)							
4. Estimation of dissolved oxygen in water (Winkler's Method)							
5. Conductometric titration of mixture of acids (HCl & CH <sub>3</sub> COOH) with strong base							
6. Estimation of Fe <sup>2+</sup> ion by potentiometric titration							
7. Estimation of HCl by pH- Metry							
8. Conductometric precipitation titration using BaCl <sub>2</sub> -Na <sub>2</sub> SO <sub>4</sub>							
<b>L = 45, P = 30, SL = 45, TOTAL = 120 PERIODS</b>							

  
Chairman (BoS)



<b>COURSE OUTCOMES:</b>													
<b>At the end of the course, the students will be able to:</b>													
COs	Course Outcome											Cognitive Level	
CO1	Interpret the treatment solutions for drinking water, boiler feed water, and wastewater reuse.											Understand	
CO2	Describe different types of electrochemical cells, including galvanic and electrolytic cells.											Understand	
CO3	Categorize different energy storage methods, such batteries, fuel cell and solar cell for the production of electricity.											Understand	
CO4	Summarize the basics concepts of polymer chemistry in designing the materials for engineering and technology.											Understand	
CO5	Illustrate the nano materials and composites for engineering and technology.											Understand	
<b>TEXT BOOKS:</b>													
1. S S. Dara and S. S. Umare, "A Text book of Engineering Chemistry", S.Chand & Co.Ltd., 12 <sup>th</sup> Edition, 2015.													
2. P.C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub. Co., 16 <sup>th</sup> Edition, 2013.													
3. Wiley, "Engineering Chemistry", Wiley India Pvt. Ltd., 2 <sup>nd</sup> Edition, 2013.													
<b>REFERENCES:</b>													
1. Dr. A. Ravikrishnan, "Engineering Chemistry", Srikrishna Hi-tech Publishing Company Pvt. Ltd., 21 <sup>st</sup> Edition, 2022.													
2. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, "Vogel's Text book of Quantitative Chemical Analysis", Pearson Education Pvt., Ltd., 6 <sup>th</sup> Edition, 2019.													
3. Shashi Chala, "A Text book of Engineering Chemistry", Dhanpat Rai Pub. Co., 2015.													
4. S. K. Bhasin and Sudha Rani, "Laboratory Manual of Engineering Chemistry", Dhanpat Rai Publishing Company Private Limited, 3 <sup>rd</sup> Edition, 2012.													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	3	2	-	-	-	1	-	2	1	-	1	-	-
CO2	3	2	-	-	-	1	-	2	1	-	1	-	-
CO3	3	2	-	-	-	1	-	2	1	-	1	-	-
CO4	3	2	-	-	-	1	-	2	1	-	1	-	-
CO5	3	2	-	-	-	1	-	2	1	-	1	-	-
1-low, 2-medium, 3-high													

**Laboratory Equipment Details**  
(Requirements for a batch of 30 students)

S.No.	Description of Equipment	Quantity required
1.	Electronic balance	1 No.
2.	pH meter	6 Nos.
3.	Conductivity meter	6 Nos.
4.	Potentiometer	6 Nos.

*Chairman*  
**Chairman (BoS)**



24ITP16	PROGRAMMING FOR PROBLEM SOLVING LABORATORY	Category	L	T	P	SL	C
		ESC	0	0	30	0	1

(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE)

**PREREQUISITE:**

Students are expected to have foundational knowledge of basic programming principles. This includes an understanding of variables and data types such as integers, floats, and characters, as well as familiarity with fundamental control structures like conditional statements (if-else) and loops (for, while).

**OBJECTIVES:**

The lab is designed to provide hands-on experience with fundamental computer applications like MS Word, Excel, PowerPoint, and MS Access. It also aims to develop practical programming skills in C, enabling students to write, debug, and execute programs that incorporate core concepts such as control flow, functions, strings, pointers, and file handling. The lab will help students apply theoretical knowledge to real-world problems, enhancing their problem-solving and programming proficiency.

**List of Experiments:**

1. Prepare a Bio-data using MS Word with appropriate page, text and table formatting options and send the same to too many recipients using mail merge.
2. Prepare a mark sheet with five subjects for five students in MS Excel File using Formulas, Functions and charts.
3. i) Prepare a Power Point presentation for your organization with varying animation effects using timer.  
ii) Prepare a Student Database in MS Access, manipulate the data and generate report.
4. Design an algorithm and flowchart with example.
5. Program using I/O statements and expressions.
6. Programs using decision-making constructs: if-else, goto, switch-case, break-continue.
7. Loops: for, while, do-while.
8. Arrays: 1D and 2D
9. Functions: passing parameters by (value, reference), Recursion.
10. Strings: operations.
11. Pointers.
12. Structures and File operations.



L=0, T=0, P=30, SL=0, TOTAL: 30 PERIODS

*S. Srinivasan*  
**Chairman (BoS)**

**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Experiment	Cognitive Level
CO1	Apply the basic concept of MS word, Excel, Power Point presentation and MS Access.	1,2,3,4	Apply
CO2	Develop the program using the concept of control statements.	5,6,7	Apply
CO3	Demonstrate the use of functions and arrays in Programming.	8,9	Apply
CO4	Apply the concepts of pointers and strings.	10,11	Apply
CO5	Develop the program using the files and structure operations.	12	Apply

**REFERENCES:**

- 1.Jeff Szuha, "Learn C Programming", Packt Publishing, United Kingdom, Second Edition, 2022.
- 2.E Balagurusamy, "Programming In Ansi C", McGraw Hill Education, Eighth Edition, 2019.

**Mapping of COs with POs and PSOs**

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

1-low, 2-medium, 3-high

**LIST OF EQUIPMENTS (For a Batch of 30 Students)**

Sl. No	Name of the Equipment's	Qty.
1.	A computer with a modern processor and sufficient RAM.	30 Nos.
2.	Microsoft Office Suite (preferably MS Office 2016 or later) including: <ul style="list-style-type: none"> <li>• MS Word (for document preparation and mail merge)</li> <li>• MS Excel (for mark sheet creation, formulas, functions, and charts).</li> <li>• MS PowerPoint (for presentations with animations and timers).</li> <li>• MS Access (for database creation, data manipulation, and report generation).</li> <li>• Email Client (e.g., Outlook or any configured email system) for sending mail merge outputs.</li> </ul>	30 Nos.
3.	Turbo C software or any standard C Compiler (e.g., GCC, Code Blocks)	30 Nos.

*S. Gajjar*  
Chairman (BoS)



24MEP16	ENGINEERING GRAPHICS LABORATORY	Category	L	T	P	SL	C
		ESC	15	0	30	15	2

(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), IT, ECE, EEE)

**PREREQUISITE**

Engineering Graphics Laboratory requires a good understanding of geometry. This includes knowledge of shapes, angles, dimensions, and spatial reasoning. The ability to visualize and interpret three-dimensional objects from two-dimensional drawings is crucial.

**OBJECTIVES:**

Instruct the utility of drafting & modeling packages in orthographic and isometric drawings and train the usage of 2D and 3D modeling

**List of Exercise/Experiments:**

1. Study of drawing tools, commands and coordinate systems in 2D software.
2. Cycloid and Conic curves.
3. Orthographic projections of pictorial views.
4. Orthographic views of straight lines.
5. Orthographic views of planes.
6. Orthographic views of simple solids.
7. The sectional view and the true shape of simple solids.
8. Development of lateral surfaces of simple solids.
9. Isometric projection of simple solids.
10. Drafting the 2D multi-view drawings from 3D model.

**LIST OF EQUIPMENT (for a batch of 30 Students)**

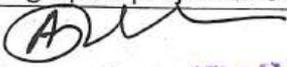
S.No.	Name of the Equipment	Quantity
1.	Intel i3 Processor, 8 GB RAM with 2 GB Graphics Card	30 Nos
2.	Licensed software for drafting and modeling	30 Nos

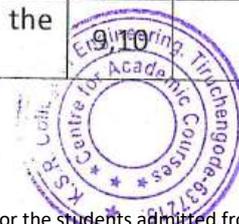
L:15 P:30 SL:15 TOTAL: 60 PERIODS

**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Exp. No.	Cognitive Level
CO1	Explain the fundamentals of engineering drawing and AutoCAD tool.	1	Understand
CO2	Construct projections of points, lines, and planes, then develop a virtual drawing using AutoCAD tool.	2,3 & 4	Apply
CO3	Apply projection principles to convert pictorial views into orthographic drawings	5,6	Apply
CO4	Model the Solid Projections and Sectioning of the solids by the AutoCAD tool.	7,8	Apply
CO5	Develop isometric drawings of simple objects reading the orthographic projections of those objects.		Apply

  
A. S. Nairman (BOS)



**REFERENCES:**

1. Bhatt. N. D., Engineering Drawing, Charotar Publishing House, Fifty Third Edition, 2014.
2. Basant Agarwal and Agarwal. C. M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, 2018.

**Mapping of COs with POs and PSOs**

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

1-low, 2-medium, 3-high

  
Chairman (BoS)



24GEP16	ENGINEERING EXPERIENCE LABORATORY	Category	L	T	P	SL	C
		ESC	0	0	30	0	1
<b>(Common to BME, CSE, CSE(CS), CSD, CSE(IoT), ECE, EEE, IT)</b>							
<b>PREREQUISITE:</b>							
A solid foundation in basic electrical components such as switches, wires, fuses, and light bulbs, including the roles of line, neutral, and ground wires. Basic understanding of physics and core principles of electrical and mechanical engineering.							
<b>OBJECTIVE:</b>							
To develop practical skills in basic electrical wiring, electronic interfacing with Arduino and IoT, and fundamental mechanical tools and systems.							
<b>LIST OF EXPERIMENTS</b>							
<b>GROUP - A (ELECTRICAL)</b>							
<ol style="list-style-type: none"> <li>1. Fluorescent lamp wiring.</li> <li>2. Stair-case wiring.</li> <li>3. Residential house wiring using switches, fuse, indicator and lamp.</li> <li>4. Measurement of Energy in single phase system.</li> </ol>							
<b>GROUP - B (ELECTRONICS)</b>							
<ol style="list-style-type: none"> <li>1. Study of Electronic Components, Instruments, Internet of Things (IoT) and Arduino IDE.</li> <li>2. Controlling the Light Emitting Diode (LED) with a push button using Arduino.</li> <li>3. Interfacing of a Sensor (Ultrasonic, Rain, Voltage, Current &amp; PIR) with Arduino Uno.</li> <li>4. Controlling of LED through Wi-Fi using ESP8266.</li> </ol>							
<b>GROUP - C (MECHANICAL)</b>							
<ol style="list-style-type: none"> <li>1. Study of plumbing line sketches for water supply and carpentry tools.</li> <li>2. Study of welding tools and centrifugal pump.</li> </ol>							
<b>COURSE OUTCOMES:</b>							
<b>At the end of the course, the students will be able to:</b>							
<b>COs</b>	<b>Course Outcome</b>						<b>Bloom's Taxonomy Level</b>
CO1	Construct different types of wiring used in residential houses.						Apply
CO2	Measure the energy in single-phase system.						Apply
CO3	Demonstrate different electronic components, instruments, IoT and Arduino IDE.						Apply
CO4	Construct the control circuit with the help of Arduino and sensors.						Apply
CO5	Describe the plumbing, carpentry, welding components and centrifugal pump works for engineering practices and applications.						Understand

  
**Chairman (BOS)**



**REFERENCES:**

1. Gupta J.P., "A Course in Electrical Installation Estimating and Costing", S.K. Kataria and Sons, Delhi, Reprint 2013 Edition, 2013.
2. Mike Cheich, "Arduino Book for Beginners", Programming Electronics Academy, 2021.

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	2	2	3	2	-	3	-	-
CO2	3	3	2	-	-	2	2	3	2	-	3	-	-
CO3	3	3	2	-	-	-	2	3	2	-	3	-	-
CO4	3	3	2	-	-	-	2	3	2	-	3	-	-
CO5	3	3	2	-	-	-	2	3	2	-	3	-	-

**LIST OF EQUIPMENT (For a Batch of 30 Students)**

S.No.	Name of the Equipment	Qty.
1.	Single-phase house wiring setup	2 Nos.
2.	Staircase wiring setup	2 Nos.
3.	Fluorescent lamp wiring setup	2 Nos.
4.	Energy Meter	5 Nos.
5.	Electrical Measuring Instruments	10 Nos.
6.	Ultrasonic Sensor	5 Nos.
7.	Rain Sensor	5 Nos.
8.	Voltage Sensor	5 Nos.
9.	Current Sensor	5 Nos.
10.	PIR Sensor	5 Nos.
11.	ESP8266 & Cable	15 Nos.
12.	Arduino UNO & Cable	15 Nos.
13.	DHT 11	5 Nos.
14.	Temperature sensor	5 Nos.
15.	Red LED	15 Nos.
16.	2-leg push Button	15 Nos.
17.	4-leg push Button	15 Nos.
18.	Personal Computer	15 Nos.

  
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24SSP19	APTITUDE AND CODING SKILLS – I	Category	L	T	P	SL	C	
		EEC	0	0	30	0	1	
<b>(Common to All Branches)</b>								
<b>OBJECTIVES:</b> The course aims to introduce students to the fundamentals of aptitude, highlighting its importance and real-world applications. It is designed to build proficiency in verbal reasoning, thereby enhancing analytical and problem-solving skills. The curriculum also focuses on developing a strong foundation in English grammar, essential for effective communication.								
<b>UNIT - I</b>	<b>BASIC OF NUMBER SYSTEMS &amp; FOUNDATION</b>							(6)
Introduction to Number System and its Classification - Divisibility Rules and Problems –Place Value & Face Value - HCF & LCM and its properties.								
<b>UNIT - II</b>	<b>BASICS OF SHARE BASED CONCEPTS</b>							(6)
Introduction to Average – Basics of Ratio and proportion – Basics of Partnership–Introduction to Percentage								
<b>UNIT - III</b>	<b>LOGICAL REASONING</b>							(4)
Analogies - Alpha and numeric series - Number Series - Coding and Decoding - Direction and distance								
<b>UNIT - IV</b>	<b>VERBAL ABILITY</b>							(7)
Introduction to Grammar – Tenses – Parts of Speech – Preposition – Articles – Modal Verbs								
<b>UNIT - V</b>	<b>C PROGRAMMING</b>							(7)
C Basics-Control Statements Decision making – Functions – Arrays & Strings – Pointers - User Defined Data Types - Storage Classes - Memory Management - Preprocessor.								
<b>TOTAL: 30 PERIODS</b>								
<b>COURSE OUTCOMES:</b> <b>At the end of the course, the students will be able to:</b>								
COs	Course Outcome							Cognitive Level
CO1	Explain the classification of number systems, apply divisibility rules to identify number properties							Understand
CO2	Apply the concepts of averages, ratios, and proportions to solve real-life problems and interpret data effectively.							Apply
CO3	Solve number series problems by identifying and applying suitable numerical patterns or rules.							Apply
CO4	Apply the rules of grammar to enhance written and spoken communication.							Apply
CO5	Apply the fundamental concepts of C programming to develop efficient and structured programs.							Apply

*Anupurna*  
Chairman (BoS)



<b>TEXT BOOKS:</b>													
1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations.													
2. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning													
3. Wren & Martin, High School English Grammar & Composition													
4. Brian W. Kernighan and Dennis Ritchie, The C Programming Language 2e, Pearson Education, 2015.													
5. Yashavant Kanetkar, The C Programming Language 2e, BPB publications, 15 <sup>th</sup> Edition, 2016													
<b>REFERENCES:</b>													
1. <a href="https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm">https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm</a>													
2. Stephen G. Kochana, Programming in C, 3 <sup>rd</sup> Edition.													
3. K. N. King, C Programming: A Modern Approach, 2e, 2008.													
4. Aaron M. Tenenbaum, Yedidiah Langsam, and Moshe J. Augenstein, Data Structures Using C, Pearson Education-India, 1990.													
5. Robert L. Kruse and Bruce P. Leung, Data Structures and Program Design in C, Pearson Education 2007.													
6. <a href="https://www.geeksforgeeks.org/c-programming-language/">https://www.geeksforgeeks.org/c-programming-language/</a>													
7. <a href="https://www.geeksforgeeks.org/data-structures/">https://www.geeksforgeeks.org/data-structures/</a>													
<b>Mapping of COs with POs and PSOs</b>													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	2	-	-	3	-	-
CO2	3	3	2	-	2	-	-	2	-	-	3	-	-
CO3	3	3	2	-	2	-	-	2	-	-	3	-	-
CO4	3	3	2	-	2	-	-	2	-	-	3	-	-
CO5	3	3	2	-	2	-	-	2	-	-	3	-	-
Avg.	3	3	3	-	2	-	-	2	-	-	3	-	-

*Amey*  
Chairman (BoS)



24CST29	PYTHON PROGRAMMING	Category	L	T	P	SL	C	
		ESC	45	0	0	45	3	
<b>(Common to All Branches)</b>								
<b>PREREQUISITE:</b> A basic understanding of programming principles such as variables and loops, paired with good problem-solving abilities is required. Logical thinking and analytical skills are critical for effective programming.								
<b>OBJECTIVES:</b> To provide a comprehensive foundation in Python programming, covering core concepts, data structures, OOP principles, file and database handling as well as web and GUI development using frameworks like Django and Tkinter.								
<b>UNIT – I</b>	<b>FUNDAMENTALS OF PYTHON</b>							<b>(9)</b>
Introduction to Python – Advantages of Python programming – Variables and Data types – Comments – Indentation – I/O function – Operators – Selection control structures – Looping control structures – Functions: Declaration – Types of arguments – Anonymous functions: Lambda.								
<b>UNIT – II</b>	<b>HANDLING STRINGS AND EXCEPTIONS</b>							<b>(9)</b>
Strings – List – Tuples – Dictionaries – Sets – Exception Handling: Built-in Exceptions – User-defined exception – Modules and Packages.								
<b>UNIT – III</b>	<b>OBJECT ORIENTED PROGRAMMING CONCEPTS</b>							<b>(9)</b>
Object Oriented Programming basics – Inheritance and Polymorphism – Operator Overloading and Overriding – Get and Set Attribute Values – Name Mangling – Duck Typing – Relationships.								
<b>UNIT – IV</b>	<b>FILES AND DATABASES</b>							<b>(9)</b>
File I/O operations – Directory Operations – Reading and Writing in Structured Files: CSV and JSON – Data manipulation using MySQL.								
<b>UNIT – V</b>	<b>WEBPROGRAMMING AND GUI USING PYTHON</b>							<b>(9)</b>
Frameworks: Introduction to Django – Django CRUD – Socket Programming – Sending email – UI design: Tkinter – Events – CGI: Introduction to CGI Programming, GET and POST Methods.								
<b>L=45, SL=45, TOTAL: 90 PERIODS</b>								

  
**Chairman (BoS)**



<b>COURSE OUTCOMES:</b>													
<b>At the end of the course, the students will be able to:</b>													
<b>COs</b>	<b>Course Outcome</b>											<b>Cognitive Level</b>	
CO1	Describe Python syntax to write code using data types, operators, loops and conditionals.											Understand	
CO2	Interpret string manipulation, data structures and exception handling to build robust applications.											Understand	
CO3	Implement object-oriented programming principles including inheritance and polymorphism to design effective solutions.											Apply	
CO4	Apply file I/O operations and database management techniques to efficiently manage and manipulate data.											Apply	
CO5	Develop web applications and graphical user interfaces using Python frameworks and libraries.											Apply	
<b>TEXT BOOKS:</b>													
1. Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, 5th Edition, 2023.													
2. Wesley J.Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2017.													
<b>REFERENCES:</b>													
1. Robert Oliver, "Python Quick Start Guide: The Simplified Beginner's Guide to Python Programming Using Hands-On Projects and Real-World Applications", Clyde Bank Media LLC,1st Edition, 2023													
2. Allen B. Downey, "Think Python", O'Reilly Media, 2nd Edition, 2016.													
3. David Beazley, Brian K. Jones, "Python Cookbook", O'Reilly Media, 3rd Edition, 2013													
4. Mark Lutz, "Python Pocket Reference", O'Reilly Media,5th Edition, 2014													
5. www.python.org													
6. <a href="https://onlinecourses.swayam2.ac.in/cec22_cs20/preview">https://onlinecourses.swayam2.ac.in/cec22_cs20/preview</a>													
<b>Mapping of COs with POs and PSOs</b>													
<b>COs/ POs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>
CO1	3	2	-	-	-	-	-	1	1	-	2	2	-
CO2	3	2	-	-	-	-	-	1	1	-	2	2	1
CO3	3	3	2	-	-	-	-	1	1	-	2	3	2
CO4	3	3	2	-	-	-	-	1	1	-	2	3	3
CO5	3	3	2	-	-	-	-	1	1	-	2	3	3
<b>1-low, 2-medium, 3-high</b>													

  
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24CST21	DESIGN THINKING	Category	L	T	P	SL	C	
		PCC	30	0	0	30	2	
<b>(COMMON TO CSE, CSE(CS), CSE(IOT), CSD and IT)</b>								
<b>PRE-REQUISITE</b>								
Students are expected to have an empathetic mindset to help them understand users, a curious mindset to explore and questions assumptions, a collaborative mindset for interdisciplinary teamwork, an iterative approach for refining ideas and creativity to generate innovative solutions								
<b>OBJECTIVES</b>								
To equip students with knowledge and skills in Design Thinking by introducing its fundamental principles and guiding them through the stages of Feel, Define, Divergence and Convergence and Communication using practical tools and case studies to encourage creative problem solving and user centered innovation								
<b>UNIT - I</b>	<b>FUNDAMENTALS OF DESIGN THINKING</b>						<b>(6)</b>	
What is Design Thinking? – When to use Design Thinking? – How to do it? – Who are involved in this? – Design The Thinking – Personal Visualization, The Wheel of Life & Balancing Priorities – Appreciating 'Design' – The 3 Laws of Design Thinking.								
<b>UNIT - II</b>	<b>STEP 1: THE 'FEEL' STAGE</b>						<b>(6)</b>	
What is this stage about? – What role does a Design Thinker play in this stage? Tools – What is the purpose in this stage? – Persona – Journey Mapping – Stakeholder Mapping & CATWOE Analysis – Cartographic Perspective (LO) – Empathy Map – Case Study: Understanding the Stakeholders.								
<b>UNIT - III</b>	<b>STEP 2: THE 'DEFINE' STAGE</b>						<b>(6)</b>	
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Five-Whys – Anti-Pattern – Paraphrasing the Problem – Challenge Mapping – LORD: Definitive skill set for a Design Thinker – Case Study: Relooking at the Problem.								
<b>UNIT - IV</b>	<b>STEP 3: THE 'DIVERGENCE' &amp; 'CONVERGENCE' STAGE</b>						<b>(6)</b>	
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – Brainstorming – Metaphor – Random Association Technique – End-State Visualization – 10gm-100gm-1000gm – Prototyping – Wire framing for digital products – Case Study: Prototyping and Communicating for Effective Outcome.								
<b>UNIT - V</b>	<b>STEP 5: THE 'COMMUNICATION' STAGE</b>						<b>(6)</b>	
What is this stage about? – What role does a Design Thinker play in this stage? – What is the most important aspect of this stage? – Tools – What is the purpose in this stage? – The 4Cs Framework – Naming – Packaging – Story boarding – Presentation – Distribution.								
<b>L=30, T=0, P=0, TOTAL: 30 PERIODS</b>								

  
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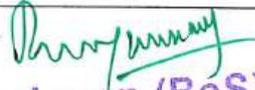
<b>COURSE OUTCOMES:</b>													
<b>At the end of the course, the students will be able to:</b>													
<b>COs</b>	<b>Course Outcome</b>											<b>Cognitive Level</b>	
<b>CO1</b>	Summarize the key principles of design thinking and their relevance to real-world problem contexts.											Understand	
<b>CO2</b>	Interpret the significance of a design mindset in fostering creativity and innovation.											Understand	
<b>CO3</b>	Apply design thinking methods effectively at each stage of the problem-solving process.											Apply	
<b>CO4</b>	Implement the phases of design thinking to address complex challenges systematically.											Apply	
<b>CO5</b>	Execute design thinking techniques and tools to create, test, and refine potential solutions.											Apply	
<b>TEXT BOOKS:</b>													
<ol style="list-style-type: none"> <li>1. UnMukt – The Science &amp; Art of Design Thinking, Arun Jain</li> <li>2. Don Norman, The Design of Everyday Things, MIT Press, 2013</li> <li>3. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and inspires innovation, Harper Collins Publishers Ltd, New York, First Edition, 2009.</li> </ol>													
<b>REFERENCES:</b>													
<ol style="list-style-type: none"> <li>1. Chrisitan Mueller-Roterberg, Handbook of Design Thinking – Tips &amp; Tools for how to design thinking, kindle Direct Publishing, First Edition, 2018.</li> <li>2. Johnny Schneider, Understanding Design Thinking, Lean and Agile, O'Reilly Media, California, First Edition, 2017</li> <li>3. Roger Martin, The Design of Business, Why Design Thinking is the next competitive advantage, Harvard Business Press, United States, First Edition, 2009.</li> <li>4. Idris Mootee, Design Thinking for Strategic Innovation, John Wiley &amp; Sons Inc, New Jersey, First Edition, 2013.</li> </ol>													
<b>Mapping of COs with POs and PSOs</b>													
<b>COs /</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	2	-	-	-	-	1	1	1	-	1	2	1
<b>CO2</b>	2	2	-	-	-	-	1	1	1	-	1	2	1
<b>CO3</b>	3	3	2	-	-	-	1	1	1	-	1	3	2
<b>CO4</b>	3	3	2	-	-	-	1	1	1	-	1	3	3
<b>CO5</b>	3	3	3	-	-	-	1	1	1	-	1	3	3
<b>1-low, 2-medium, 3-high</b>													

  
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24GET29	தமிழரும் தொழில் நுட்பமும்	CATEGORY	L	T	P	SL	C
		HSMC	15	0	0	15	1
(அனைத்து துறைகளுக்கும் பொதுவானது)							
முன் கூட்டிய துறைசார் அறிவு : தேவை இல்லை							
அலகு -I	நெசவு மற்றும் பாணைத் தொழில்நுட்பம்						[03]
சங்ககாலத்தில் நெசவுத் தொழில் - பாணைத் தொழில்நுட்பம் கருப்பு சிவப்பு பாண்டங்கள்- பாண்டங்களில் கீறல் குறியீடுகள்							
அலகு -II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்						[03]
சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமானப் பொருட்களும் நடுகல்லும்-சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள்-மாமல்லபுரச் சிற்பங்களும், கோவில்களும்- சோழர்காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள்-நாயக்கர் காலக்கோயில்கள்-மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன்ஆலயம் மற்றும் திருமலைநாயக்கர்மஹால் - செட்டிநாட்டுவீடுகள்-பிரிட்டிஷ்காலத்தில் சென்னை இந்தோ-சாரோசெனிக் கட்டிடக்கலை.							
அலகு -III	உற்பத்தித் தொழில்நுட்பம்						[03]
கப்பல் கட்டும் கலை-உலோகவியல்-இரும்புத்தொழிற்சாலை-இரும்பை உருக்குதல், எஃகு- வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்கநாணயங்கள்-நாணயங்கள் அச்சடித்தல்-மணி உருவாக்கும் தொழிற்சாலைகள்-கல் மணிகள்-கண்ணாடி மணிகள்-சுடு மண்மணிகள்- சங்குமணிகள்-எலும்புத்துண்டுகள்-தொல்லியல் சான்றுகள்-சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.							
அலகு -IV	வேளாண்மை மற்றும் நீர்ப் பாசனத் தொழில்நுட்பம்						[03]
அணை, ஏரி, குளங்கள், மதகு-சோழர்காலகுமிழித்தூம்பின் முக்கியத்துவம்-கால்நடை பராமரிப்பு- கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள்-வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள்-கடல்சார் அறிவு - மீன் வளம்-முத்து மற்றும் முத்துக் குளித்தல்-பெருங்கடல் குறித்த பண்டைய அறிவு-அறிவுசார் சமூகம்.							
அலகு -V	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்						[03]
அறிவியல் தமிழின் வளர்ச்சி- கணினித்தமிழ் வளர்ச்சி-தமிழ் நூல்களை மின்பதிப்பு செய்தல்- தமிழ் மென் பொருட்கள் உருவாக்கம்-தமிழ் இணையக்கல்விக் கழகம்-தமிழ் மின்நூலகம்- இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.							
Total (L= 15, SL=15) =30 Periods							

பாடம் கற்றத்தின் விளைவுகள் : பாடத்தை வெற்றிகரமாக கற்று முடித்த பின்பு, மாணவர்களால் முடியும் விளைவுகள்	அறிவாற்றல் நிலை
C01 சங்ககாலத் தமிழிர்களின் நெசவு மற்றும் பாணைவனைதல் தொழில் நுட்பம் குறித்து கற்றுணர்தல்.	புரிதல்
C02 சங்ககாலத் தமிழிர்களின் கட்டிட தொழில் நுட்பம் கட்டுமான பொருட்கள் மற்றும் அவற்றை விளக்கும் தளங்கள் குறித்து அறிவு.	புரிதல்
C03 சங்ககாலத் தமிழிர்களின் உலோகத் தொழில், நாணயங்கள் மற்றும் மணிகள் சார்ந்த தொல்லியல் சான்றுகள் பற்றிய அறிவு.	புரிதல்
C04 சங்ககாலத் தமிழிர்களின் வேளாண்மை, நீர்ப்பாசன முறைகள் மற்றும் முத்து குளித்தல் குறித்த தெளிவு.	புரிதல்
C05 நவீன அறிவியல் தமிழ் மற்றும் கணினி தமிழ் குறித்த புரிந்துகொள்ளலும் மற்றும் பயன்படுத்தலும்.	பகுப்பாய்வு

  
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Text Books :	
1	தமிழகவரலாறு- மக்களும் பண்பாடும்- கேகேபிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்)
2	கணினித்தமிழ் - முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
Reference Books :	
1	கீழடி- வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்.(தொல்லியல் துறை வெளியீடு)
2	பொருறை - ஆற்றங்கரை நாகரிகம் ( தொல்லியல் துறை வெளியீடு)
3	Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by : The Author)
4	Porunai Civilization (Jointly Published by: Department of Archaeology &Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-
1. சிறிது (குறைந்த) 2. மிதமான (நடுத்தர) 3. கணிசமான (உயர்)													

*Aravindan*

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24GET29	TAMILS AND TECHNOLOGY	CATEGORY	L	T	P	SL	C
		HSMC	15	0	0	15	1
(Common to All Branches)							
<i>Prerequisite(s): No prerequisites are needed for enrolling into the course</i>							
<b>UNIT - I</b>	<b>WEAVING AND CERAMIC TECHNOLOGY</b>						<b>[03]</b>
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.							
<b>UNIT - II</b>	<b>DESIGN AND CONSTRUCTION TECHNOLOGY</b>						<b>[03]</b>
Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram– Sculptures and Temples of Mamallapuram– Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple) – ThirumalaiNayakar Mahal –Chetti Nādu Houses, Indo –Saracenic architecture at Madras during British Period.							
<b>UNIT - III</b>	<b>MANUFACTURING TECHNOLOGY</b>						<b>[03]</b>
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.							
<b>UNIT - IV</b>	<b>AGRICULTURE AND IRRIGATION TECHNOLOGY</b>						<b>[03]</b>
Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.							
<b>UNIT - V</b>	<b>SCIENTIFIC TAMIL &amp; TAMIL COMPUTING</b>						<b>[03]</b>
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.							
<b>Total (L= 15, SL=15) =30 Periods</b>							
<b>Course Outcomes:</b>							
<b>At the end of the course, the student will be able to</b>							<b>Cognitive Level</b>
CO1	Understand the weaving and ceramic technology of ancient Tamil People nature.						Understand
CO2	Comprehend the construction technology, building materials in sangam Period and case studies.						Understand
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence						Understand
CO4	Realize the agriculture methods, irrigation technology and pearl diving.						Understand
CO5	Apply the knowledge of scientific Tamil and Tamil computing.						Apply

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Text Books:	
1	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
Reference Books:	
1	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
2	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished by International Institute of Tamil Studies).
3	Keeladi – ‘Sangam City Civilization on the banks of river Vaigai; (Jointly Published by: Department of Archaeology &Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
4	Studies in the History of India with Special Reference to Tamilnadu (dr.K.K.Pillay) (Published by.: The Author)

Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	3	3	-	2	-	3	-	-
CO2	-	-	-	-	-	3	3	-	2	-	3	-	-
CO3	-	-	-	-	-	3	3	-	2	-	3	-	-
CO4	-	-	-	-	-	3	3	-	2	-	3	-	-
CO5	-	-	-	-	-	3	3	-	2	-	3	-	-
Avg.	-	-	-	-	-	3	3	-	2	-	3	-	-
1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)													

  
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24MAI29	PROBABILITY AND STATISTICS	Category	L	T	P	SL	C
		BSC	30	15	30	45	4

**SEMESTER II - B.E / B.TECH ( Common to All Branches )**

**PREREQUISITE:**

A basic understanding of algebra, calculus, and introductory statistics is required to grasp the concepts of probability, hypothesis testing, and statistical methods used in engineering and quality control.

**OBJECTIVES:**

To build a foundational understanding of probability and random variables, enable the application of two-dimensional random variables in engineering contexts, develop the ability to perform hypothesis testing for both small and large samples, introduce the principles of experimental design in agricultural studies, and provide knowledge of statistical quality control techniques.

<b>UNIT - I</b>	<b>ONE DIMENSIONAL RANDOM VARIABLES</b>	<b>(9)</b>
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One dimensional Random Variable - Discrete and continuous random Variables -Expectations - Moment generating functions and their properties - Binomial, Poisson, Uniform and Normal distributions.

<b>UNIT - II</b>	<b>TWO - DIMENSIONAL RANDOM VARIABLES</b>	<b>(9)</b>
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Joint distributions – Marginal and conditional distributions – Covariance – Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Regression Analysis.

<b>UNIT - III</b>	<b>TESTING OF HYPOTHESIS</b>	<b>(9)</b>
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One sample and two sample test for means of large samples (Z- test), One sample and two sample test for means of small samples (t-test), Chi-square - Independent of Attributes - F test for equality of variances.

<b>UNIT - IV</b>	<b>DESIGN OF EXPERIMENTS</b>	<b>(9)</b>
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Analysis of variance - One way and two way classifications - Completely Randomized Design - Randomized Block Design - Latin Square Design.

<b>UNIT - V</b>	<b>STATISTICAL QUALITY CONTROL</b>	<b>(9)</b>
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Control charts for measurements ( $\bar{X}$  and R charts) – Control charts for C and P charts – Acceptance sampling for construction of an OC curve.

**List of Exercise/Experiments (R Software):**

- Determine the probability by using binomial distribution.
- Find the probability with the help of normal distribution.
- Determine the correlation co-efficient between X and Y.
- Calculate and plot the regression lines.
- Test the significance of difference between experimental and theoretical values of the data by using chi-square test.
- Examine the small samples using F distribution.
- Analyze the data using Randomized Block Design (RBD).
- Inspect the data using Latin Square Design (LSD).
- Find the  $\bar{X}$  and R charts.
- Compute c and p charts.



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**L = 30 , T = 15 & P = 30 & SL = 45, TOTAL: 120 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Apply the concepts of one dimensional random variables to compute expectations and analyze the standard distributions.	Apply
CO2	Apply statistical methods to compute marginal and conditional distributions, and perform correlation and regression analysis.	Apply
CO3	Apply Z-test, t-test, Chi-square test, and F-test to analyze sample data and draw inferences on independence of attributes.	Apply
CO4	Apply analysis of variance techniques for one-way and two-way classifications, and implement experimental designs using CRD, RBD and LSD.	Apply
CO5	Construct control charts for measurements Mean and Range charts and attributes charts to assess process control and product quality.	Apply

**TEXT BOOKS:**

1. S.P. Gupta, "Statistical Methods", Sulthan Chand & Sons, 46<sup>th</sup> Edition ,2021.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4<sup>th</sup> edition, 2007.

**REFERENCES:**

1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8<sup>th</sup> Edition, 2014.
2. Spiegel. M.R., Schiller. J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
3. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 9<sup>th</sup> Edition, 2010.
4. R.C.Gupta, "Statistical Quality Controls", Khanna Publishers, Delhi, 8<sup>th</sup> Edition , 2008.

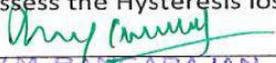
**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO 5	PO 6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	2	-	-	1	-	-	2	-	-
CO2	3	3	3	3	2	-	-	1	-	-	2	-	-
CO3	3	3	3	3	2	-	-	1	-	-	2	-	-
CO4	3	3	3	3	2	-	-	1	-	-	2	-	-
CO5	3	3	3	3	2	-	-	1	-	-	2	-	-
Avg.	3	3	3	3	2	-	-	1	-	-	2	-	-

1-low, 2-medium, 3-high

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Chairman (BoS)



24PHI07	ENGINEERING PHYSICS	Category	L	T	P	SL	C
		BSc	45	-	30	45	4
(Common to AIDS, BME,CSE,CSE(IoT),CS,ECE,EEE &IT)							
<b>PREREQUISITE:</b> The students must have knowledge about basic concepts of light sources, dual nature of radiation, conductivity of metals, semiconducting materials, different types of magnetic materials, super conducting materials and their applications.							
<b>OBJECTIVES:</b> To provide a comprehensive understanding of the fundamental principles, mechanisms, applications of lasers, fiber optics, quantum physics, semiconductors, magnetic materials and superconductors in modern Science and technology.							
<b>UNIT – I</b>	<b>LASER AND FIBRE OPTICS</b>	<b>(9)</b>					
<b>Lasers:</b> Principles of spontaneous emission and stimulated emission - Einstein's co-efficient A & B- population inversion – CO <sub>2</sub> laser – semiconductor diode laser – homo – junction & hetero – junction (qualitative analysis only) – applications. <b>Fibre Optics:</b> propagation of light in optical fibre– numerical aperture and acceptance angle – types of optical fibre (materials, refractive index profile and modes of propagation) – applications -fibre optic sensors: pressure and displacement sensors.							
<b>UNIT – II</b>	<b>QUANTUM MECHANICS</b>	<b>(9)</b>					
Introduction – black body radiation– Planck's theory (derivation) – deduction of Wien's displacement law and Rayleigh – Jean's Law from Planck's theory– Compton effect (derivation) – de-Broglie concept of matter waves – physical significance of a wave function – Schrödinger wave equations (Time dependent & time independent) – particle in a box (one dimensional).							
<b>UNIT – III</b>	<b>CONDUCTING MATERIALS</b>	<b>(9)</b>					
Classical free electron theory – expression for electrical conductivity – thermal conductivity – Wiedemann-Franz law – drawbacks of classical free electron theory – quantum theory – Fermi energy – Fermi-Dirac distribution function – density of states and carrier concentration of metals.							
<b>UNIT – IV</b>	<b>SEMICONDUCTING MATERIALS</b>	<b>(9)</b>					
Introduction – Intrinsic semiconductor: carrier concentration in an intrinsic semiconductor– Fermi level of an intrinsic semiconductor– variation of Fermi energy level with temperature – Extrinsic semiconductors: carrier concentration in n– type and p-type semiconductors (qualitative analysis only)– Fermi level of extrinsic semiconductors– variation of Fermi energy level with temperature and carrier concentration in an extrinsic semiconductors – Hall effect – determination of Hall co-efficient for n – and p – type semiconductors– applications.							
<b>UNIT – V</b>	<b>MAGNETIC AND SUPERCONDUCTING MATERIALS</b>	<b>(9)</b>					
<b>Magnetic Materials:</b> Introduction – origin of magnetic moment – dia, para and ferromagnetic materials– domain theory of ferro-magnetism – Hysteresis – soft and hard magnetic materials. <b>Superconducting Materials:</b> Introduction to superconductivity – properties and types of superconductor – application of superconductors: magnetic levitation– SQUIDS– cryotron.							
<b>List of exercises/experiments:</b> <ol style="list-style-type: none"> <li>Determine the thickness of the given thin paper using Air wedge method.</li> <li>Find the acceptance angle and numerical aperture of a given optical fibre.</li> <li>Evaluate the wavelength of semiconductor laser.</li> <li>Estimate the particle size of the lycopodium powder using semiconductor laser</li> <li>Enumerate the thermal conductivity of a bad conductor by Lee's disc method.</li> <li>Compute the band gap of an intrinsic semiconductor.</li> <li>Calculate the width of the CD groove with a help of semiconductor laser.</li> <li>Assess the Hysteresis loss of magnetic materials using B-H curve.</li> </ol>							
 <b>D. R. V. M. RAJESARAJAN</b> CHAIRMAN		<b>Lecture: 45, Laboratory: 30, SL:45, TOTAL: 120 PERIODS</b>					

BOARD OF STUDIES (S&H)  
 K.S.R. COLLEGE OF ENGINEERING  
 TIRUCHENGODUR  
 KSRCE Curriculum and Syllabi (R 2024)



Course Outcomes: At the end of the course, the students will be able to:													
COs	Course Outcome											Cognitive level	
CO1	Elucidate laser principles, types, light propagation and the applications of optical fibers.											Understand	
CO2	Apply quantum theory for Planck's theory, Compton Effect and Schrödinger's equation of matter waves.											Apply	
CO3	Calculate electrical conductivity and Fermi energy by considering quantum free electron theory.											Apply	
CO4	Infer charge carrier behavior in intrinsic, extrinsic semiconductors and Hall effect.											Understand	
CO5	Describe principles, classifications, applications of magnetic materials and superconductors.											Understand	
<b>Text Books :</b>													
1. M.N. Avadhanulu and P.G. Kshirsagar, "A text book of Engineering Physics", S. Chand and Company, New Delhi, 11 <sup>th</sup> Edition, 2018.													
2. R.K. Gaur & S.L. Gupta, "Engineering Physics", Dhanpat Rai Publication, New Delhi, 7 <sup>th</sup> Edition, 2014.													
<b>Reference Books :</b>													
1. R. Murugesan and Kiruthiga Sivaprasath, "Modern Physics", S. Chand & Company, New Delhi, 17 <sup>th</sup> Edition, 2014.													
2. V. Rajendran, "Engineering Physics", Tata McGraw-Hill, New Delhi, 1 <sup>st</sup> Edition, 2011.													
3. S.O. Pillai, "Solid State Physics", New Age Publication, Chennai, 10 <sup>th</sup> Edition, 2023.													
4. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw-Hill, New Delhi, 7 <sup>th</sup> Edition, 2015.													
<b>Mapping of COs with POs and PSOs</b>													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO 1	PSO 2
CO1	3	2	-	-	-	-	1	2	2	-	2	-	-
CO2	3	3	2	-	-	-	1	2	2	-	2	-	-
CO3	3	3	2	-	-	-	1	2	2	-	2	-	-
CO4	3	2	-	-	-	-	1	2	2	-	2	-	-
CO5	3	2	-	-	-	-	1	2	2	-	2	-	-
Avg.	3	2	-	-	-	-	1	2	2	-	2	-	-
1-low, 2-medium, 3-high													

  
BoS chairman

**Chairman (BoS)**



24ECI26	DIGITAL PRINCIPLES AND SYSTEM DESIGN	Category	L	T	P	SL	C
		PCC	45	0	30	45	4
<b>PREREQUISITE:</b> Students should have basic knowledge on binary numbers, logic gates, algebra and discrete mathematics.							
<b>OBJECTIVE:</b> This course provides a comprehensive understanding of digital logic design, covering number systems, Boolean algebra, combinational and sequential circuits, and processor architecture. It equips students with the skills to design and analyze digital systems using logic gates, Karnaugh maps, and Hardware Description Languages (HDL).							
<b>UNIT - I</b>	<b>BOOLEAN ALGEBRA AND LOGIC GATES</b>	<b>(9)</b>					
Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions using Karnaugh Map and Tabulation Methods – Logic Gates.							
<b>UNIT - II</b>	<b>COMBINATIONAL LOGIC</b>	<b>(9)</b>					
Combinational Circuits – Analysis and Design Procedures – Adder and Subtractor – Magnitude Comparator – Code Converters – Decoders and Encoders – Multiplexers and Demultiplexers.							
<b>UNIT - III</b>	<b>SYNCHRONOUS SEQUENTIAL LOGIC</b>	<b>(9)</b>					
Sequential Circuits – Latches and Flip Flops – Analysis and Design Procedures – State Reduction and State Assignment – Shift Registers – Counters.							
<b>UNIT - IV</b>	<b>PROCESSOR DESIGN</b>	<b>(9)</b>					
Processor Organization – Design of ALU: Arithmetic Circuits – Logic Circuits – Arithmetic Logic Unit – Status Register – Design of Shifter – Processor Unit.							
<b>UNIT - V</b>	<b>SIMPLE COMPUTER DESIGN AND HDL</b>	<b>(9)</b>					
Inter Register Transfer – Conditional Control Statements – Instruction Codes – Design of a Simple Computer – Hardware Description Language (HDL) for Combinational Circuits and Sequential Logic Circuits							
<b>List of Experiments:</b>							
1. Verification of Boolean theorems using logic gates.							
2. Design and implementation of combinational circuits using logic gates for arbitrary functions, Code Converters.							
3. Design and implementation of combinational circuits using MSI devices:							
a) 4 - bit binary adder / subtractor							
b) Parity generator / checker							
c) Multiplexers and De-Multiplexers							
4. Design and implementation of sequential circuits:							
a) Shift-registers							
b) Synchronous counter							
5. HDL Models for combinational / sequential circuits.							
<b>TOTAL(T:45, P:30, SL:45) : 120 PERIODS</b>							
<b>COURSE OUTCOMES:</b> <b>At the end of the course, the learners will be able to:</b>							
COs	Course Outcome	Exp. No	Cognitive Level				
CO1	Apply Boolean theorems and techniques, Karnaugh Map and Tabulation method for simplifying Boolean functions.	1	Apply				
CO2	Develop skills to design and analyze combinational logic circuits, including adders, subtractors, and multiplexers.	2,3	Apply				
CO3	Design synchronous sequential circuits using latches, flip-flops	4	Apply				
CO4	Design processors which include arithmetic and logic circuits.	4	Apply				

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Chairman (BoS)



CO5	Design simple computer architectures and implement using HDL for both combinational and sequential logic circuits										5	Apply	
<b>TEXT BOOKS:</b>													
1. Morris Mano, M., "Digital Logic and Computer Design", Prentice-hall of India private limited, First Edition, 2016.													
2. John F. Wakerly, "Digital Design Principles and Practices", Pearson Education, Fourth Edition, 2008.													
<b>REFERENCES:</b>													
1. Charles H. Roth Jr, "Fundamentals of Logic Design", Jaico Publishing House, Fifth Edition, 2003.													
2. Kharate, G.K., "Digital Electronics", Oxford University Press, First Edition, 2012.													
3. Morris Mano, M., and Michael D. Ciletti, "Digital Design", Pearson Education, Fifth Edition, 2013.													
4. Donald D. Givone, "Digital Principles and Design", Tata McGraw Hill, First Edition, 2003.													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	1	2	-	-	3	-	-
CO2	3	3	2	-	2	-	1	2	-	-	3	-	-
CO3	3	3	2	-	2	-	1	2	-	-	3	-	-
CO4	3	3	2	-	2	-	1	2	-	-	3	-	-
CO5	3	3	2	-	3	-	1	2	-	-	3	-	-

**LIST OF EQUIPMENT (For a batch of 30 students)**

Sl.No.	Name of the Equipment	Qty
1	Digital IC Tester	2
2	Digital IC Trainer Kit	15
3	Dual/Single Mode Power Supply	15
4	Digital Multimeter	5
5	Computer with HDL Simulation Software	5
6	IC7400	50
7	IC7404	50
8	IC7402	50
9	IC7408	50
10	IC7411	50
11	IC7432	50
12	IC7483	50
13	IC7485	50
14	IC7486	50
15	IC7474	50
16	IC7476	50
17	IC7447	50
18	Bread Board	20
19	Wires	Sufficient Quantity

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24ENP29	PROFESSIONAL COMMUNICATION LABORATORY	Category	L	T	P	SL	C	
		HSMC	0	0	30	0	1	
<b>(Common to All Branches)</b>								
<b>OBJECTIVE:</b> To enhance learners' proficiency in listening, speaking, reading, and writing through structured activities and professional communication practices relevant to academic and workplace settings.								
<b>UNIT - I</b>	<b>VERBAL AND CRITICAL REASONING</b>							<b>(6)</b>
<b>Syllogism</b> – Drawing conclusions from given logical statements, <b>Assertion and Reason</b> – Judging the link between a claim and its reason, <b>Verbal Analogies</b> – Completing word pairs based on relationships, <b>Statement and Assumption</b> – Identifying hidden assumptions in statements, <b>Statement and Conclusion</b> – Choosing valid conclusions from given data, <b>Critical Reasoning</b> – Evaluating arguments for logic and consistency.								
<b>UNIT - II</b>	<b>LISTENING</b>							<b>(6)</b>
<b>Listening to Announcement</b> – Understanding key details and context from public messages, <b>Short Conversation</b> – Extracting specific information from brief dialogues, <b>Motivational Speech</b> – Grasping main ideas, tone, and speaker's intent, <b>Telephone Conversation</b> – Comprehending spoken exchanges over the phone.								
<b>UNIT - III</b>	<b>SPEAKING</b>							<b>(6)</b>
<b>Talking about Oneself</b> – Sharing personal details clearly and confidently, <b>Oral-presentation on a General Topic</b> – Presenting ideas briefly with clarity and structure, <b>Group Discussion on Current Affairs</b> – Expressing and support opinions in group settings, <b>Role Play</b> – Performing situational conversations using appropriate language, <b>Mock &amp; HR Interview</b> – Answering common interview questions with clarity and confidence.								
<b>UNIT - IV</b>	<b>READING</b>							<b>(6)</b>
<b>Reading Short Texts</b> – Understanding the main message and key ideas, <b>Reading for General and Specific Information</b> – Locating relevant details in various texts, <b>Case Studies on Problem Solving</b> – Analyzing real-life scenarios to identify issues and solutions.								
<b>UNIT - V</b>	<b>WRITING</b>							<b>(6)</b>
<b>Written communication: Letters (Apology &amp; Complaint)</b> – Writing formal letters using appropriate tone and structure, <b>E-mails (Appreciation &amp; Permission)</b> – Composing clear and courteous emails, <b>Technical Report</b> – Using standard format for preparing structured technical report, <b>Agenda / Minutes</b> – Preparing format for meeting agendas and recording minutes.								
<b>TOTAL (P:30) = 30 PERIODS</b>								

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Chairman (BoS)



**List of Experiments:**

1. Syllogism, Assertion & Reason and Verbal Analogies
2. Statement & Assumption, Statement & Conclusion and Critical Reasoning
3. Listening: Announcement and Short Conversation
4. Listening: Motivational Speech and Telephone Conversation
5. Speaking: Talking about oneself, Mock & HR Interview and Mini-presentation
6. Speaking: Group Discussion and Role Play
7. Reading: Multiple Choice & Fill in the Blanks
8. Reading: Analyzing Case Studies on Problem Solving
9. Writing: Complaint/Apology Letter and Appreciation/Permission Email
10. Writing: Format of Technical Report and Format of Agenda/Minutes

**COURSE OUTCOMES:**

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

COs	Description	Ex. No.	Cognitive Level
CO1	Comprehend assumptions and draw conclusions from verbal reasoning tasks.	1 & 2	Understand
CO2	Understand spoken texts to identify key points and the speaker's intent.	3 & 4	Understand
CO3	Use appropriate language and tone in personal, group, and interview conversations.	5 & 6	Understand
CO4	Recognize main ideas and supporting points in short texts and case studies.	7 & 8	Understand
CO5	Draft formal letters, emails, reports, and meeting notes in the correct format.	9 & 10	Understand

**TEXT BOOKS:**

1. Bhatnagar Nitin, Communicative English for Engineers and Professionals, Pearson India, 2010.
2. Kulbhusan Kumar, RS Salaria, Effective Communication Skill, Khanna Publishing House, 2018.

**REFERENCES:**

1. Jack C Richards, Interchange, Cambridge University Press, 2022.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S Chand, 2024.

**Mapping of COs with POs and PSOs**

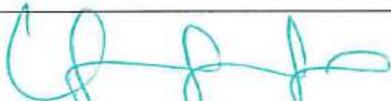
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	-	-	-	-	-	-	2	3	-	-	-	-
CO2	2	-	-	-	-	-	-	2	3	-	-	-	-
CO3	2	-	-	-	-	-	1	2	3	-	-	-	-
CO4	2	-	-	-	-	-	1	-	3	-	-	-	-
CO5	2	-	-	-	-	-	1	-	3	-	-	-	-

1-Low, 2-Medium, 3-High

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24CSP29	PYTHON PROGRAMMING LABORATORY	Category	L	T	P	SL	C
		ESC	0	0	30	0	1
<b>(Common to All Branches)</b>							
<b>PREREQUISITE:</b> Students must have basic knowledge on programming principles, such as variables, simple data types, control structures, problem solving and logical thinking skills.							
<b>OBJECTIVES:</b> To develop programming skills in Python by performing string operations using functions for mathematical problem-solving, applying conditionals and loops, exploring sets and dictionaries for data handling and gaining foundational knowledge in polymorphism, exception handling, GUI design and web development.							
<b>List of Exercise/Experiments:</b> <ol style="list-style-type: none"> <li>1. Implementing programs using Strings. (reverse, palindrome, character count, replacing characters)</li> <li>2. Implementing programs using Functions (GCD of two numbers, Factorial)</li> <li>3. Scientific problems using conditional statements and loops. (Largest among three numbers, Number series, Number Patterns)</li> <li>4. Implementing real-time applications using Sets, Dictionaries (Sorting, Searching, Remove Duplicates)</li> <li>5. Implementing real-time/technical applications using Lists, Tuples. (Swapping two elements, Reversing a List / Sorting Tuples)</li> <li>6. Create a Python program to demonstrate polymorphism with inheritance. (Single, Multilevel Inheritance, Hierarchical)</li> <li>7. Implement a simple calendar in python program without using the calendar module using string array or list.</li> <li>8. Write a program to demonstrate the user-defined exception handling mechanism in Python.</li> <li>9. Design and implement a graphical user interface to perform any arithmetic operation.</li> <li>10. Implementing a web application with MySQL database integration for CRUD operations (Flask / Django Framework)</li> </ol>							
<b>L=0, T=0, P=30, TOTAL: 30 PERIODS</b>							

  
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**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Experiments	Cognitive Level
CO1	Apply string operations and functions to solve problems like reversing text, palindrome check, GCD, and factorial.	1,2	Apply
CO2	Solve problems and manage data efficiently using conditionals, loops, sets, and dictionaries.	3,4	Apply
CO3	Develop applications using lists, tuples, and demonstrate polymorphism through inheritance in Python.	5,6	Apply
CO4	Build programs in Python that effectively use arrays or lists along with custom exception handling.	7,8	Apply
CO5	Implement GUI applications and web-based systems with MySQL integration to perform CRUD operations.	9,10	Apply

**REFERENCES:**

1. Yashwant Kanetkar, Aditya Kanetkar, "Let Us Python", BPB Publications, 5th Edition, 2023.
2. Wesley J.Chun, "Core Python Programming", Pearson Education, 2nd Edition, 2017.

**Mapping of COs with POs and PSOs**

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

1-low, 2-medium, 3-high

**LIST OF EQUIPMENTS (For a Batch of 30 Students)**

Sl.No	Name of the Equipment's	Qty.
1.	A computer with a modern processor, RAM and Windows or Linux.	30 Nos.
2.	Programming Tools: Python 2.7.11 / 3.x with IDLE	30 Nos.
3.	IDEs: Eclipse (PyDev), VS Code, Jupyter Notebook	30 Nos.

  
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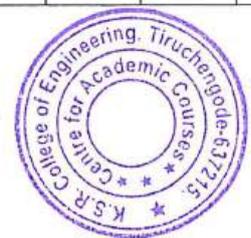
24SSP29	APTITUDE AND CODING SKILLS –II	Category	L	T	P	SL	C
		EEC	0	0	30	0	1
<b>(Common to All Branches)</b>							
<b>OBJECTIVES:</b>							
This course aims to expose students to various concepts of aptitude problem solving, enabling them to tackle problems effectively and enhance their analytical skills in alignment with company-specific requirements. It also focuses on developing proficiency in verbal reasoning to strengthen critical thinking abilities.							
<b>UNIT - I</b>	<b>NUMBERS AND SHARE BASED CONCEPTS</b>						(6)
Problems on Numbers – Unit Digits – Squares and Cubes – Remainder Theorem – Averages - Ratio Proportions and Partnership – Percentage – Profit and Loss.							
<b>UNIT - II</b>	<b>BASICS OF WORK BASED CONCEPTS</b>						(6)
Introduction to time and work –Introduction to Time, Speed and Distance, Problems on Trains.							
<b>UNIT - III</b>	<b>LOGICAL REASONING</b>						(4)
Blood Relations – Ranking and Ordering – Inequalities – Cause and Effect.							
<b>UNIT - IV</b>	<b>VERBAL ABILITY</b>						(7)
Yes or No and “WH” Questions – Conjunctions – Count / Uncounted Nouns – Direct and Indirect Speech – Active and Passive Voice.							
<b>UNIT - V</b>	<b>PYTHON PROGRAMMING FUNDAMENTALS</b>						(7)
Introduction-Features-Environment setup; Basic syntax: variable-data types-operators-control statements-if-if-else- loop-break-continue, etc. List- operations on list; String operations- access; Tuple: operations on tuple; Dictionaries: Accessing dictionaries, working with dictionaries; Functions- Exception Handling-Input & Output-Modules-OOPs concepts-Numerical Programming.							
<b>TOTAL: 30 PERIODS</b>							
<b>COURSE OUTCOMES:</b>							
<b>At the end of the course, the students will be able to:</b>							
COs	Course Outcome						Cognitive Level
CO1	Interpret fundamental concepts to analyse and approach basic quantitative problems effectively.						Understand
CO2	Apply the concepts of time and work, time, speed and distance, to solve real-time quantitative aptitude problems effectively.						Apply
CO3	Apply logical reasoning techniques to solve problems related to ranking and ordering, decision-making and analytical skills.						Apply
CO4	Apply grammatical concepts to construct grammatically correct and contextually appropriate sentences.						Apply
CO5	Apply fundamental Python programming concepts to develop and implement basic computational solutions.						Apply

*Anupama*  
Chairman (BoS)



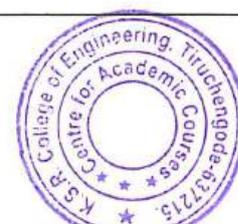
<b>TEXT BOOKS:</b>													
<ol style="list-style-type: none"> <li>1. R S Aggarwal, Quantitative Aptitude for Competitive Examinations.</li> <li>2. R.S. Aggarwal, A Modern Approach to Verbal &amp; Non-Verbal Reasoning.</li> <li>3. Wren &amp; Martin, High School English Grammar &amp; Composition</li> <li>4. Allen B. Downey, Think Python: How to Think like a Computer Scientist, 2<sup>nd</sup> Edition, O'Reilly Publishers, 2016</li> <li>5. Karl Beecher, Computational Thinking: A Beginner's Guide to Problem Solving and Programming, 1<sup>st</sup> Edition, BCS Learning &amp; Development Limited, 2017.</li> </ol>													
<b>REFERENCES:</b>													
<ol style="list-style-type: none"> <li>1. Paul Deitel and Harvey Deitel, Python for Programmers, Pearson Education, 1<sup>st</sup> Edition, 2021.</li> <li>2. Martin C. Brown, Python: The Complete Reference, 4<sup>th</sup> Edition, Mc-Graw Hill, 2018.</li> <li>3. <a href="https://www.python.org/">https://www.python.org/</a></li> </ol>													
<b>Mapping of COs with POs and PSOs</b>													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	2	-	-	3	-	-
CO2	3	3	2	-	2	-	-	2	-	-	3	-	-
CO3	3	3	2	-	2	-	-	2	-	-	3	-	-
CO4	3	3	2	-	2	-	-	2	-	-	3	-	-
CO5	3	3	2	-	2	-	-	2	-	-	3	-	-
Avg.	3	3	3	-	2	-	-	2	-	-	3	-	-

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24MAT37	DISCRETE MATHEMATICAL STRUCTURES	Category	L	T	P	SL	C
		BSC	45	15	0	60	4
<b>SEMESTER III - (Common to CSE, CSE(CS), CSD, CSE(IoT) &amp; IT)</b>							
<b>PREREQUISITE:</b> Basic knowledge of set theory, elementary algebra, and mathematical logic, along with analytical thinking skills, is essential for understanding the concepts of discrete structures and their applications in computer science.							
<b>OBJECTIVES:</b> To provide students with a strong foundation in discrete mathematical structures, including propositional and predicate logic, set theory, functions, graph theory, and combinatorics, with a focus on their significance and applications in computer science.							
<b>UNIT - I</b>	<b>PROPOSITIONAL CALCULUS</b>						<b>[12]</b>
Propositions – Logical connectives – Compound propositions - Conditional and biconditional propositions - Truth tables - Tautologies and contradictions - Contra positive - Logical equivalences and implications - Normal forms - Principal conjunctive and disjunctive normal forms - Rules of inference Theory - Validity of arguments.							
<b>UNIT - II</b>	<b>PREDICATE CALCULUS</b>						<b>[12]</b>
Predicates - Statement functions – Variables - Free and bound variables – Quantifiers - Universe of discourse - Logical equivalences and implications for quantified statements - Theory of inference - The rules of universal specification and generalization - Validity of arguments.							
<b>UNIT - III</b>	<b>SET THEORY AND FUNCTIONS</b>						<b>[12]</b>
Set Theory: Cartesian product of sets - Relation on sets – Types of relations and their properties - Relational matrix and the graph of a relation - Equivalence relation. Functions: Definition – Classification of functions – Composition of functions – Inverse functions – Permutation functions.							
<b>UNIT - IV</b>	<b>GRAPH THEORY</b>						<b>[12]</b>
Graphs - Types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths - Trees - Spanning trees - Shortest path algorithm: Dijkstra's algorithm and Kruskal's algorithm.							
<b>UNIT - V</b>	<b>COMBINATORICS</b>						<b>[12]</b>
Mathematical induction – Counting principle – Sum and product rule – The pigeonhole principle - Recurrence relations – Solution of recurrence relations – Generating Functions – Solving recurrence relation by generating functions.							
<b>L = 45, T = 15, SL = 60, TOTAL = 120 PERIODS</b>							

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**COURSE OUTCOMES: At the end of the course, the students will be able to:**

COs	Course Outcome	Cognitive Level
CO1	Apply the propositional concepts to determine tautologies, normal forms and validate arguments using rules of inference.	Apply
CO2	Apply the concepts of predicates, quantifiers and rules of inference to validate arguments involving quantified statements.	Apply
CO3	Apply the principles of set theory to represent and examine the relations and functions.	Apply
CO4	Apply the graph theory concepts of Euler and Hamiltonian paths and solve shortest path problems using Dijkstra's and Kruskal's algorithms.	Apply
CO5	Apply the principles of mathematical induction, counting techniques and the pigeonhole principle to solve recurrence relations.	Apply

**TEXT BOOKS:**

1. Trembly J.P, and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Publishing Co. Ltd, New Delhi, 43<sup>rd</sup> Re-print 2014.
2. Venkatraman M.K, Sridharan. N and Chandrasekaran N. "Discrete Mathematics", 'The National Publishing Company', Chennai, 2014.

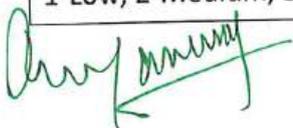
**REFERENCES:**

1. Kenneth. H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw Hill P.Co, 2013, 7<sup>th</sup> Edition.
2. Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, "Discrete Mathematical Structures", Pearson Education Pvt Ltd., New Delhi, 2013, Sixth Indian reprint.
3. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5<sup>th</sup> Edition, Pearson Education Asia, Delhi, 2013.
4. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
5. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3<sup>rd</sup> Edition, 2010.
6. <https://www.youtube.com/watch?v=DmCltf8ypks>

**Mapping of COs with POs and PSOs**

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

1-Low, 2-Medium, 3-High


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24CBT31	OPERATING SYSTEMS AND SECURITY	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
<b>PREREQUISITE:</b> Basic knowledge of computer architecture, programming, and fundamental concepts of operating systems.							
<b>OBJECTIVES:</b> To provide foundational and advanced understanding of operating systems and their security mechanisms, emphasizing process, memory, and access control management.							
<b>UNIT - I</b>	<b>OPERATING SYSTEM OVER VIEW</b>	<b>(9)</b>					
Computer-System Organization – Architecture – Operating-System Operations – Resource Management – Security and Protection – Distributed Systems – Kernel Data Structures – Operating-System Services – System Calls – System Services – Why Applications Are Operating System Specific – Operating-System Design and Implementation – Operating-System Structure.							
<b>UNIT - II</b>	<b>PROCESS MANAGEMENT</b>	<b>(9)</b>					
Process Concept – Process Scheduling – Operation on Processes, Inter-process Communication – Threads – Overview – Multithreading models – Threading issues; CPU Scheduling – Scheduling criteria, Scheduling algorithms. Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery-Semaphores-monitors.							
<b>UNIT - III</b>	<b>MEMORY MANAGEMENT AND FILE SYSTEMS</b>	<b>(9)</b>					
Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation – Virtual Memory – Demand Paging, Page Replacement. Mass Storage system – HDD Scheduling – File concept, Access methods, Directory Structure, Directory implementation, Allocation Methods, Free Space Management.							
<b>UNIT - IV</b>	<b>SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS</b>	<b>(9)</b>					
Security Goals – Trust and Threat Model – Access Control Fundamentals – Protection System – Reference Monitor – Secure Operating System Definition – Assessment Criteria – Information Flow – Information Flow Secrecy Models – Denning’s Lattice Model – Bell LaPadula Model – Information Flow Integrity Models – Biba Integrity Model – Low-Water Mark Integrity – Clark Wilson Integrity.							
<b>UNIT - V</b>	<b>SECURITY IN OPERATING SYSTEMS</b>	<b>(9)</b>					
UNIX Security – UNIX Protection System – UNIX Authorization – UNIX Security Analysis – UNIX Vulnerabilities – Windows Security – Windows Protection System – Windows Authorization – Windows Security Analysis – Windows Vulnerabilities – Address Space Layout Randomizations-Introduction to Security Kernels.  Case Studies: GEMINI Operating System.							
<b>L=45, SL=45, TOTAL= 90 PERIODS</b>							

  
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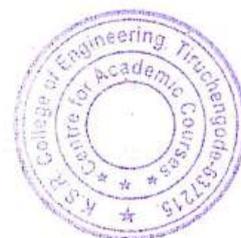
<b>COURSE OUTCOMES:</b>													
<b>At the end of the course, the students will be able to:</b>													
<b>COs</b>	<b>Course Outcome</b>											<b>Cognitive Level</b>	
<b>CO1</b>	Classify the fundamental components and operations of modern operating systems, including architecture, system services, and kernel-level functions.											Understand	
<b>CO2</b>	Analyze process management techniques such as scheduling algorithms, inter-process communication, deadlock handling, and thread management.											Analyze	
<b>CO3</b>	Demonstrate effective memory management strategies and file system mechanisms, including paging, segmentation, and storage allocation.											Apply	
<b>CO4</b>	Examine secure system models and frameworks including access control, information flow models, and formal security verification methods.											Analyze	
<b>CO5</b>	Assess and compare the security mechanisms and vulnerabilities in UNIX and Windows operating systems through real-world case studies.											Apply	
<b>TEXT BOOKS:</b>													
1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition, 2021.													
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.													
<b>REFERENCES:</b>													
1. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015													
2. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, New York, 1988.													
3. William Stallings, "Operating Systems – Internals and Design Principles", 9th Edition, Pearson, 2017.													
4. Andrew S. Tanenbaum, Herbert Bos – <i>Modern Operating Systems</i> , 4th Edition, Pearson, 2014.													
5. Michael Sikorski and Andrew Honig – Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software, No Starch Press, 2012.													
<b>NPTEL LINKS:</b>													
1. <a href="https://archive.nptel.ac.in/courses/106/105/106105214/">https://archive.nptel.ac.in/courses/106/105/106105214/</a>													
<b>Mapping of COs with POs and PSOs</b>													
<b>COs / POs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>
CO1	3	2	-	-	-	-	-	1	1	-	1	2	3
CO2	3	3	3	2	-	-	-	1	1	-	1	3	3
CO3	3	3	2	-	-	-	-	1	1	-	1	3	3
CO4	3	3	3	2	-	-	-	1	1	-	1	3	3
CO5	3	3	2	-	-	-	-	1	1	-	1	3	2
<b>1 - Low, 2 - Medium, 3 – High</b>													

  
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24CBT36	DATA STRUCTURES AND ALGORITHMS	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
<b>(Common To CSE-CS, CSD and CSE (IoT) )</b>							
<b>PREREQUISITE:</b> Basic knowledge of programming concepts in C.							
<b>OBJECTIVES:</b> To enable students to design, implement, and analyze efficient data structures and algorithms for optimized problem-solving with attention to time and space complexity.							
<b>UNIT – I</b>	<b>BASICS OF DATA STRUCTURES</b>	<b>(9)</b>					
Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Doubly linked lists – Circularly linked lists. Applications of lists.							
<b>UNIT - II</b>	<b>STACKS AND QUEUES</b>	<b>(9)</b>					
Stack ADT – Implementation of Stack using Array and Linked List – Applications of Stack: Evaluating arithmetic expressions – Conversion of Infix to postfix expression. Queue ADT – Implementation of Queue using Array and Linked List – Circular Queue – Applications of Queues.							
<b>UNIT - III</b>	<b>TREES AND GRAPHS</b>	<b>(9)</b>					
Tree ADT – Binary Tree ADT – Binary Tree Traversal – Expression Trees Binary Search Tree – AVL Trees – Graphs and its Types – Breadth First Traversal – Depth First Traversal – Topological Sort – BI Connectivity - B-Tree - B+ Tree.							
<b>UNIT - IV</b>	<b>SEARCHING, HASHING AND SORTING</b>	<b>(9)</b>					
Searching: Linear and Binary Search – Sorting: Bubble Sort – Selection Sort – Insertion Sort – Heap Sort. Hashing: Hash function – Separate Chaining – Open Addressing: Linear Probing, Quadratic Probing and Double Hashing – Rehashing – Extendible Hashing							
<b>UNIT - V</b>	<b>ALGORITHM DESIGN AND ANALYSIS</b>	<b>(9)</b>					
Fundamentals of algorithmic problem solving – Algorithm analysis framework – Asymptotic Notations – - Divide and Conquer: Merge Sort-Quick Sort- Greedy Algorithm: Huffman's Code–Dynamic Programming-Traveling Salesman's Problem- Minimum Spanning Tree: Prim's Algorithm – Kruskal's Algorithm – Single Source Shortest Path Algorithm: Dijkstra's Algorithm.							
<b>L=45, SL=45,TOTAL= 90 PERIODS</b>							

  
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**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Understand the concepts and implementation of linear data structures such as arrays and linked lists.	Understand
CO2	Implement stacks and queues using arrays and linked lists, and apply them to solve expression problems.	Apply
CO3	Construct and traverse trees and graphs, and apply appropriate tree/graph-based algorithms.	Apply
CO4	Apply suitable searching, sorting, and hashing techniques for efficient data management.	Apply
CO5	Analyze and compare algorithmic approaches like divide and conquer, greedy, and dynamic programming.	Analyze

**TEXT BOOKS:**

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 3rd Edition, Pearson Education, 2007.
2. Cormen, Thomas H., Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Introduction to algorithms. MIT press, 2022.

**REFERENCES:**

1. Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms"; Fourth Edition, Mcgraw Hill/ MIT Press, 2022.
3. Alfred V. Aho, Jeffrey D. Ullman, John E. Hopcroft, Data Structures and Algorithms, 1st edition, Pearson, 2002.
4. Kruse, Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2006.
5. Ellis Horowitz, Sartaj Sahni, and Dinesh Mehta, "Fundamentals of Data Structures in C", 2nd Edition, Universities Press, 2008

**Mapping of COs with POs and PSOs**

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

1-low, 2-medium, 3-high

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24CBT33	PROGRAMMING IN JAVA	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
<b>PREREQUISITE:</b> Basic knowledge of programming concepts, familiarity with any procedural language like C or C++, and understanding of logic building and algorithmic thinking.							
<b>OBJECTIVES:</b> To equip students with the skills to build robust Java applications by applying object-oriented programming concepts, handling files and threads, and utilizing collections and database connectivity.							
<b>UNIT – I</b>	<b>INTRODUCTION TO JAVA PROGRAMMING</b>	<b>(9)</b>					
Introduction - Features of OOPs - Java Development Kit (JDK) - Java Runtime Environment (JRE) - JVM Structure of a Java Program - Data Types – Variables – Operators - Expressions - Conditional and Control Structures: if, else, switch, for, while, do-while – Arrays							
<b>UNIT - II</b>	<b>OOP CONCEPTS IN JAVA</b>	<b>(9)</b>					
Classes and Objects - Constructors and Overloading - this keyword - static keyword - Inheritance: Types of Inheritance - extends keyword, Method Overriding - Polymorphism and Dynamic Method Dispatch – final – Super – Access specifiers							
<b>UNIT - III</b>	<b>PACKAGES, INTERFACES &amp; EXCEPTION HANDLING</b>	<b>(9)</b>					
Packages: Defining and Importing Packages - Access Modifiers - Encapsulation - Interfaces: Interfaces - Abstract Classes - Exception Handling: try, catch, throw, throws, finally - Built-in Exceptions - User-defined Exceptions							
<b>UNIT - IV</b>	<b>INPUT/OUTPUT, FILE HANDLING AND MULTITHREADING</b>	<b>(9)</b>					
Java I/O Streams: InputStream – OutputStream – Reader – Writer - File Handling: File Handling using File, FileReader - FileWriter - Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending – Resuming - Stopping Threads - Wrappers – Auto boxing							
<b>UNIT - V</b>	<b>STRING HANDLING, COLLECTION AND DATABASE CONNECTIVITY</b>	<b>(9)</b>					
Strings: Basic String class, methods and String Buffer Class. Collection frameworks: Overview– Collection Interfaces – Collection Classes. JDBC Product Components – JDBC API – JDBC Driver Manager – JDBC Test Suite – JDBC-ODBC Bridge – JDBC Architecture – Establishing Connection – Handling SQL Exceptions.							
<b>L=45, SL=45, TOTAL= 90 PERIODS</b>							

  
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<b>COURSE OUTCOMES:</b>													
<b>At the end of the course, the students will be able to:</b>													
COs	Course Outcome											Cognitive Level	
CO1	Discuss the basic structure of Java programs, control structures, data types, and arrays used in Java.											Understand	
CO2	Explain the principles of object-oriented programming concepts such as classes, objects, constructors, and inheritance in Java.											Understand	
CO3	Apply Java programs using packages, interfaces, and handle exceptions using built-in and user-defined methods.											Apply	
CO4	Apply Java applications that perform file handling and multithreading using the Java I/O stream and thread APIs.											Apply	
CO5	Analyze and implement string manipulation, utilize Java collection frameworks, and establish database connectivity using JDBC.											Analyze	
<b>TEXT BOOKS:</b>													
1.Herbert Schildt, Dr.Danny Coward, "Java - The Complete Reference", McGraw-Hill Education, 13th Edition, 2023													
2 Cay S. Horstmann, "Core Java Volume 1 - Fundamentals", Prentice Hall, 13th Edition, 2024.													
<b>REFERENCES:</b>													
1.Herbert Schildt, "Java - A Beginner Guide", Oracle Press, McGraw-Hill Education, 10th Edition, 2024.													
2.Joshua Bloch, "Effective Java: A Programming Language Guide", Addison-Wesley Professional, 4th Edition, 2023.													
3. Herbert Schildt, "Java - A Beginner Guide", Oracle Press, McGraw-Hill Education, 8th Edition, 2019.													
4.Paul Deitel & Harvey Deitel, "Java: How to Program, Early Objects", Pearson Education, 2017													
5.Cay S. Horstmann, "Core Java Volume I – Fundamentals", 12th Edition, Prentice Hall, 2021													
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	1	1	-	-	3	-
CO2	3	2	-	-	-	-	-	1	1	-	-	3	-
CO3	3	3	2	-	3	-	-	1	1	-	-	3	2
CO4	3	3	2	-	2	-	-	1	1	-	-	3	-
CO5	3	3	3	2	2	-	-	1	1	-	1	3	3
<b>1-low, 2-medium, 3-high</b>													

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24CST38	COMPUTER ORGANIZATION AND ARCHITECTURE		Category	L	T	P	SL	C
			PCC	45	0	0	45	3
<b>(Common To CSE and CSE(CS))</b>								
<b>PREREQUISITE:</b>								
Students should have a basic understanding of digital electronics, number systems, programming and computer fundamentals to grasp the concepts of computer architecture effectively.								
<b>OBJECTIVES:</b>								
The objective of this course is to introduce the fundamental concepts of computer architecture, including computer structure, instruction execution and control mechanisms. It aims to provide a clear understanding of pipelining, control unit design, memory hierarchy, various storage devices and input/output organization with standard interfaces.								
<b>UNIT – I</b>	<b>BASIC STRUCTURE AND ARITHMETIC OPERATIONS</b>						<b>(9)</b>	
Functional Units – Basic Operational Concepts – Performance – Instruction Set Architecture – Memory Locations and Addresses – Instructions and Instruction sequencing – Addressing Modes – RISC and CISC Styles – Fixed Point and Floating Point Operations.								
<b>UNIT – II</b>	<b>BASIC PROCESSING UNIT</b>						<b>(9)</b>	
Fundamental Concepts – Instruction Execution – Hardware Components – Instruction Fetch and Execution Steps – Hardwired Control – CISC Style Processor: Micro Programmed Control – Nano Programming.								
<b>UNIT – III</b>	<b>PIPELINING EXECUTION</b>						<b>(9)</b>	
Basic Concepts – Pipeline Organization – Pipelining Issues – Data Dependencies – Memory Delays – Branch Delays – Resource Limitations – Performance Evaluation – Superscalar Operation.								
<b>UNIT– IV</b>	<b>MEMORY SYSTEM AND STORAGES</b>						<b>(9)</b>	
Basic Concepts – Semiconductor RAM Memories – Read Only Memories – Memory Hierarchy – Cache Memories – Performance Considerations – Virtual Memory – Secondary Storage Devices.								
<b>UNIT – V</b>	<b>I/O ORGANIZATION</b>						<b>(9)</b>	
Accessing I/O Devices: I/O Device Interface, Programmed I/O – Interrupts – Direct Memory Access – Buses – Bus Arbitration – Interconnection Standards: SCSI – USB – SATA.								
<b>L-45, T=0, P=0, SL=45, TOTAL: 90 PERIODS</b>								
<b>COURSE OUTCOMES:</b>								
<b>At the end of the course, the students will be able to:</b>								
COs	Course Outcome							Cognitive Level
CO1	Describe key computer architecture concepts with functional units, instruction sets, addressing modes, RISC and CISC.							Understand
CO2	Outline the instruction execution steps and working of hardwired micro programmed control.							Understand
CO3	Summarize the concept of pipelined execution and design control unit.							Understand
CO4	Illustrate the hierarchical memory system including cache memory and							Understand

	virtual memory.	
CO5	Interpret the different ways of communicating with I/O devices and standard I/O interfaces.	Understand

**TEXT BOOKS:**

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, McGraw Hill, US, Revised Sixth Edition, 2022.
2. M.Morris Mano, Computer System Architecture, McGraw Hill, United states, Revised Third Edition, 2017.

**REFERENCES:**

1. William Stallings, Computer Organization and Architecture - Designing for Performance, Prentice Hall, United states, Eighth Edition, 2010.
3. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software interface, University of California, Berkeley, Fifth Edition, 2014.
4. Carpinelli, Computer Systems Organization & Architecture, Pearson Education, India, First Edition 2001.
5. T.K Ghosh, Computer Organization and Architecture, Haldia Institute of Technology, West Bengal, Third Edition, 2011.
6. [https://onlinecourses.nptel.ac.in/noc21\\_cs61/preview](https://onlinecourses.nptel.ac.in/noc21_cs61/preview)

**Mapping of COs with POs and PSOs**

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PS O2
CO1	3	2	-	-	-	-	-	1	1	-	3	2	2
CO2	3	2	-	-	-	-	-	1	1	-	3	2	2
CO3	3	2	-	-	-	-	-	1	1	-	3	-	-
CO4	3	2	-	-	-	-	-	1	1	-	3	1	1
CO5	3	2	-	-	-	-	-	1	1	-	3	2	2

1-low, 2-medium, 3-high


**Chairman (BoS)**

24CBP31	OPERATING SYSTEMS AND SECURITY LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	45	0	1.5
<b>PREREQUISITE:</b> Basic knowledge of operating system concepts, C programming, and UNIX/Linux environment.							
<b>OBJECTIVES:</b> To implement and analyze core operating system algorithms and security mechanisms through hands-on experiments.							
<b>List of Exercise:</b> <ol style="list-style-type: none"> <li>Basics of UNIX commands.</li> <li>Unix system calls implementation.</li> <li>Implementation of CPU scheduling algorithms a. FCFS b. SJF c. Priority Scheduling.</li> <li>Bankers' algorithm for deadlock detection &amp; avoidance</li> <li>Producer consumer problem using semaphores.</li> <li>Implementation of memory allocation methods a. First bit b. Worst bit c. best bit</li> <li>Implementation of the page replacement algorithms a. FIFO b. LRU c. LFU</li> <li>Implementation of Bell Lapadula model and Dennings Lattice model</li> <li>Implementation of BIBA Integrity model and Clark Wilson integrity model</li> <li>Setting &amp; testing files and directories access control.</li> <li>Enabling and disabling address space layout randomization.</li> <li>Configuring firewalls and network security settings in Unix/Linux and Windows.</li> </ol>							
<b>P=45, TOTAL:45PERIODS</b>							

**LIST OF HARDWARE AND SOFTWARE RESOURCES****Resources Required for a Batch of 30 Students**

S.No	Details of Resource	Quantity Required
1.	Desktop Computers: 30 Nos	30
2.	Operating System: Linux or Windows 7 and above	
3.	Software: Turbo C, C++ (Version :3.0), Kali Linux	

  
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<b>COURSE OUTCOMES:</b>													
<b>At the end of the course, the students will be able to:</b>													
COs	Course Outcome										Exercise No	Cognitive Level	
CO1	Apply basic UNIX/Linux commands and system calls for operating system interaction and process management.										1,2	Apply	
CO2	Analyze and implement CPU scheduling and deadlock avoidance algorithms to optimize system performance.										3,5,6,7	Apply	
CO3	Implement memory allocation and page replacement algorithms to manage memory efficiently.										4	Apply	
CO4	Examine formal security models like Bell-LaPadula, Biba, Clark-Wilson, and Denning's Lattice for enforcing confidentiality and integrity.										8,9	Apply	
CO5	Configure access control mechanisms, firewalls, and network security settings in UNIX/Linux and Windows systems.										10,11,12	Apply	
<b>TEXT BOOKS:</b>													
<ol style="list-style-type: none"> <li>Harvey M. Deitel, Paul J. Deitel, David R. Choffnes – Operating Systems, 3rd Edition, Pearson, 2003.</li> <li>Neil Matthew, Richard Stones – Beginning Linux Programming, 4th Edition, Wrox, 2008.</li> </ol>													
<b>REFERENCES:</b>													
<ol style="list-style-type: none"> <li>Michael Palmer – Guide to Operating Systems Security, 1st Edition, Cengage Learning, 2008.</li> <li>William Shotts – The Linux Command Line: A Complete Introduction, 2nd Edition, No Starch Press, 2019.</li> <li>Chris McNab – Network Security Assessment: Know Your Network, 3rd Edition, O'Reilly, 2016.</li> <li>Robert Love – Linux Kernel Development, 3rd Edition, Addison-Wesley, 2010.</li> <li>Jonathan Corbet, Alessandro Rubini, Greg Kroah-Hartman – Linux Device Drivers, 3rd Edition, O'Reilly, 2005.</li> </ol>													
Mapping of COs with POs and PSOs													
COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	2	1	1	1	2	3
CO2	3	3	3	2	2	1	-	2	1	1	2	1	2
CO3	3	3	2	-	2	2	-	2	1	1	2	2	3
CO4	3	3	3	2	1	1	-	2	1	1	1	1	3
CO5	3	3	2	-	2	2	-	2	1	1	1	1	2
<b>1 - Low, 2 - Medium, 3 – High</b>													

  
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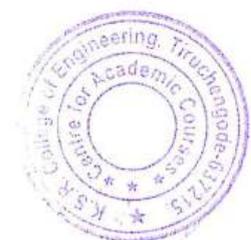


24CBP37	DATA STRUCTURES AND ALGORITHMS LABORATORY	Category	L	T	P	SL	C
		PCC	0	0	45	0	1.5
(Common To CSE-CS, CSD and CSE (IoT) )							
<b>PREREQUISITE:</b> Basic proficiency in writing, compiling, and debugging programs using C, along with logical thinking and understanding of fundamental programming constructs.							
<b>OBJECTIVES:</b> To foster practical skills in developing, testing, and debugging various data structures and algorithms for effective problem-solving in computational tasks.							
<b>List of Exercise:</b> <ol style="list-style-type: none"> <li>1. Array implementation of Stack and Queue ADTs</li> <li>2. Array implementation of List ADT</li> <li>3. Linked list implementation of List, Stack and Queue ADTs</li> <li>4. Applications of List, Stack and Queue ADTs</li> <li>5. Implementation of Binary Trees and operations of Binary Trees</li> <li>6. Implementation of Binary Search Trees</li> <li>7. Implementation of AVL Trees</li> <li>8. Graph representation and Traversal algorithms</li> <li>9. Implementation of searching and sorting algorithms</li> <li>10. Hashing – any two collision techniques</li> <li>11. Implementation of shortest path algorithm</li> </ol> <p>Implementation to find minimum cost spanning tree using Prim's Algorithm</p>							
<b>TOTAL:45PERIODS</b>							

**LIST OF HARDWARE AND SOFTWARE RESOURCES****Resources Required for a Batch of 30 Students**

S.No	Details of Resource	Quantity Required
1.	Desktop Computers: 30 Nos	30
2.	Operating System: Linux or Windows 7 and above,	
3.	Software: Turbo C, C++ (Version :3.0)	

  
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**COURSE OUTCOMES:**  
At the end of the course, the students will be able to:

COs	Course Outcome	Exercise No	Cognitive Level
CO1	Implement linear and non-linear data structure operations	1,2	Apply
CO2	Design, implement, and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications	3,4	Analyze
CO3	Design, implement, and analyse efficient tree structures	5,6,7	Analyze
CO4	Model problems as graph problems and implement efficient graph algorithms to solve them	8,11,12	Apply
CO5	Apply sorting, searching, and hashing techniques for efficient data access and manipulation	9,10	Apply

**TEXTBOOKS:**

1. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy", 5th or 6th Edition (2020+), CareerMonk Publications.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms" (CLRS), 4th Edition (2022) MIT Press
3. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Python", 1st Edition (2013) (Latest as of 2024), Wiley

**REFERENCES:**

1. Langsam, Augenstein, and Tanenbaum – Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015.
2. Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman – Data Structures and Algorithms, 1st Edition, Pearson, 2002.
3. Kruse, Tondo, and Leung – Data Structures and Program Design in C, 2nd Edition, Pearson Education, 2006.
4. Narasimha Karumanchi – Data Structures and Algorithms Made Easy, 5th Edition, CareerMonk Publications, 2016.
5. S. Sahni – Data Structures, Algorithms, and Applications in C++, 2nd Edition, Universities Press, 2005.

**Mapping of COs with POs and PSOs**

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

1-Low, 2-Medium, 3-High

  
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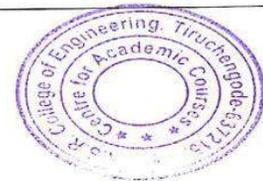


24CBP33	PROGRAMMING IN JAVA LABORATORY		Category	L	T	P	SL	C
			PCC	0	0	45	0	1.5
<b>PREREQUISITE:</b> Fundamental understanding of programming concepts along with basic familiarity with object-oriented programming principles is required.								
<b>OBJECTIVES:</b> To enable students to build real-time Java applications by applying core programming skills, advanced object-oriented features, and data handling techniques.								
<b>List of Exercise:</b>								
1.	a.	Write a simple java program using operators						
	b.	Compute sum and average of array elements						
	c.	Write a simple java program using a conditional statement						
2.	a.	Develop stack data structures using object and classes						
	b.	Develop queue data structures using object and classes						
3.	a.	Write the concepts of inheritance using java program						
	b.	Write the concepts polymorphism using java program						
4.		Develop an application using interface by accessing super class constructors and methods						
5.		Develop an employee payroll application using java packages						
6.		Implement exception handling and creation of user defined exception						
7.	a.	Implement program to multi-threading communication in java program						
	b.	Implement program to inter thread communication in java program						
8.		Develop an application to copy the contents of one file to another using FileInputS and FileOutputStream						
9.	a.	Develop an application to perform create file operation in java						
	b.	Develop an application to perform delete file operation in java						
10.		Mini Projects: String Manipulation and validation techniques.						
11.		Mini Projects: Collection Framework for Data Management.						
12.		Mini Projects: Database connectivity using JDBC						
								<b>P=45, TOTAL:45PERIODS</b>

**LIST OF HARDWARE AND SOFTWARE RESOURCES****Resources Required for a Batch of 30 Students**

S.No	Details of Resource	Quantity Required
1.	Desktop Computers: 30 Nos	30
2.	Operating System: Windows 7 and above	
3.	Software: JDK 17, Wamp server (Mysql)	

  
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<b>COURSE OUTCOMES:</b> At the end of the course, the students will be able to:			
COs	Course Outcome	Exercise No	Cognitive Level
CO1	Develop the basic structure of Java programs, control structures, data types, and arrays.	1	Apply
CO2	Implement the principles of object-oriented programming concepts such as classes, objects, constructors, and inheritance.	2,3	Apply
CO3	Apply Java programs using packages, interfaces, and handle exceptions using built-in and user-defined methods.	4,5,6	Apply
CO4	Apply Java applications that perform file handling and multithreading using the Java I/O stream and thread APIs.	7,8,9	Apply
CO5	Analyze and implement string manipulation, utilize Java collection frameworks, and establish database connectivity using JDBC.	10,11,12	Analyze

**TEXT BOOKS:**

1. Herbert Schildt, Dr. Danny Coward, "Java - The Complete Reference", McGraw-Hill Education, 13th Edition, 2023
2. Cay S. Horstmann, "Core Java Volume 1 - Fundamentals", Prentice Hall, 13th Edition, 2024.

**REFERENCES:**

1. Herbert Schildt, "Java - A Beginner Guide", Oracle Press, McGraw-Hill Education, 10th Edition, 2024.
2. Joshua Bloch, "Effective Java: A Programming Language Guide", Addison-Wesley Professional, 4th Edition, 2023.
3. Herbert Schildt, "Java - A Beginner Guide", Oracle Press, McGraw-Hill Education, 8th Edition, 2019.
4. Steven Holzner, "Java 2 Programming Black Book" Dreamtech Press, 1st Edition, 2008.
5. Paul Deitel & Harvey Deitel, "How to Program" Pearson Education, 11th Edition, 2017.

**Mapping of COs with POs and PSOs**

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

1 - Low, 2 - Medium, 3 - High

  
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24CBP36	DESIGN STUDIO – I	Category	L	T	P	SL	C
		PCC	0	0	30	0	1
<b>(Common to CSE, IT, CSE- CS, CSD)</b>							
<b>PREREQUISITE:</b>							
A basic understanding of problem-solving, logical reasoning, and the principles of design thinking, including empathy and user-centric development.							
<b>OBJECTIVES:</b>							
To apply design thinking and computational problem-solving principles to develop, prototype, and present innovative software-based and embedded system solutions using hands-on mini projects.							
<b>List of Exercise:</b>							
<b>Ex. No.</b>	<b>Title</b>	<b>Focus Area</b>					
1.	Algorithms & Flowcharts for Everyday Problems	Computational Thinking					
2.	Mini Compiler for Basic Arithmetic	Lexical Analysis					
3.	Simple Chatbot using Rule-Based Logic	NLP & Design Thinking					
4.	Web Form + Backend Logic	UI/UX + APIs					
5.	Gesture-Based Game Interface	ML Lite + Human-Centered Design					
6.	A) Blinking of LED using Tinker cad	IoT Integration					
	B) Interfacing an Ultrasonic sensor using Tinkercad						
7.	A) Weather Monitoring station using wokwi	Embedded System Simulation					
	B) Digital clock using wokwi						
8.	Password Strength Checker	Data Analysis + Computational Thinking					
9.	Autodesk Fusion - Simulation	3D Modeling + Engineering Simulation					
10.	<b>Mini Project: Complete Design Cycle</b>	Ideation → Design → Prototype → Presentation					
<b>P=30, TOTAL: 30 PERIODS</b>							

**LIST OF HARDWARE AND SOFTWARE RESOURCES****Resources Required for a Batch of 30 Students**

S.No	Details of Resource	Quantity Required
1.	Desktop Computers: 30 Nos	30
2.	Operating System: Linux or Windows 7 and above	
3.	Software: Turbo C, Visual Studio, UI/UX Applications, Tinkercad, wokwi, Autodesk.	

  
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<b>COURSE OUTCOMES:</b>			
<b>At the end of the course, the students will be able:</b>			
<b>COs</b>	<b>Course Outcome</b>	<b>Exercise No</b>	<b>Cognitive Level</b>
CO1	Identify and analyze real-world problems through design thinking and abstraction	1,2	Analyze
CO2	Apply computing principles to implement practical, user-centered solutions	3,4,5	Apply
CO3	Construct basic prototypes using software/hardware platforms	6,7	Apply
CO4	Assess the effectiveness of full-stack components or intelligent systems for specific applications.	8,9	Evaluate
CO5	Interpret and present the complete solution effectively by applying each phase of the Design Cycle.	10	Analyze

**TEXT BOOKS:**

- 1) Peter J. Denning, Matti Tedre, "Computational Thinking", MIT Press, first edition, 2019.
- 2) Zhiwei Xu, Jialin Zhang, "Computational Thinking: A Perspective on Computer Science", Springer, first edition, 2021

**REFERENCES:**

- 1) Joshua Ellul, Carl James Debono, "TinkercadNetConnector: Connecting emulated IoT devices to the outside world", SoftwareX (Elsevier), 2022.
- 2) Ahmad Zahari Misnan et al., "Embedded Internet of Things (IoT) for Beginners", Politeknik Muadzam Shah (Malaysia), 2021.
- 3) Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms (CLRS)", MIT Press, Fourth Edition, 2022.
- 4) Aho, Lam, Sethi, Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education, Second Edition, 2006.
- 5) Abelson, Sussman, "Structure and Interpretation of Computer Programs (SICP)", MIT Press, Second Edition, 1996.

**Mapping of Cos with Pos and PSOs**

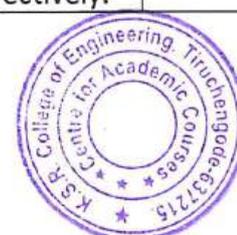
<b>COs/POs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	3	3	2	3	1	-	2	1	-	1	2	3
<b>CO2</b>	3	3	2	-	3	-	-	2	1	-	1	2	3
<b>CO3</b>	3	3	2	-	3	-	-	2	1	-	1	2	3
<b>CO4</b>	3	3	3	3	3	-	-	2	1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

1-low, 2-medium, 3-high

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24SDP39	SOFT SKILLS DEVELOPMENT – III	Category	L	T	P	SL	C
		EEC	0	0	30	0	1
<b>(Common to All Branches)</b>							
<b>OBJECTIVES:</b> To the concept of aptitude and its relevance in various fields. It highlights the need for aptitude skills and emphasizes their importance in academic and career development. It also focuses on building a strong foundation in English grammar to improve communication skills.							
<b>UNIT - I</b>	<b>TIME SPEED AND DISTANCE</b>						(6)
Relationship Between Time Speed and Distance Time Conversion – Relative Speed – Chasing – Problems on Late, Early and Usual Time							
<b>UNIT - II</b>	<b>PROBLEMS ON TRAINS</b>						(6)
Crossing a Static objects – Crossing a Moving Object: Same and Opposite Direction – Time Difference based Problems.							
<b>UNIT - III</b>	<b>BOATS AND STREAM</b>						(6)
Introduction to Boat in Still Water and Current – Down Stream Speed – Upstream Speed – Speed in Still Water – Rate of Stream.							
<b>UNIT - IV</b>	<b>LOGICAL REASONING</b>						(6)
Seating Arrangements: Circular and Linear Arrangements – Inequalities – Assertion & reasoning.							
<b>UNIT - V</b>	<b>VERBAL ABILITY</b>						(6)
Parts of Speech – Sentence Completion – Idioms and Phrases – Reading Comprehension.							
<b>TOTAL: 30 PERIODS</b>							
<b>COURSE OUTCOMES:</b> <b>At the end of the course, the students will be able to:</b>							
COs	Course Outcome	Cognitive Level					
CO1	Apply time, speed, and distance concepts to solve problems involving relative speed, time conversion, and punctuality scenarios.	Apply					
CO2	Solve problems on trains with object crossing and time differences using concepts of relative speed and direction.	Apply					
CO3	Solve problems involving boats and streams using concepts of upstream, downstream, and current speed.	Apply					
CO4	Apply logical reasoning to solve problems on seating arrangements, inequalities, and assertion-reasoning statements.	Apply					
CO5	Demonstrate understanding of grammar, vocabulary, and comprehension to complete sentences and interpret texts effectively.	Understand					

*Prasanna*  
**Chairman (BoS)**



**TEXT BOOKS:**

1. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations".
2. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations".
3. Nishit K. Sinha, "Logical Reasoning and Data Interpretation for CAT".
4. R.S. Agarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning".
5. Wren & Martin, "High School English Grammar & Composition".

**REFERENCES:**

1. Arun Sharma, Quantitative Aptitude for CAT, 11e, 2025.
2. Arun Sharma, Logical Reasoning for CAT, 7e, 2025.
3. English for Competitive Examinations – by Edgar Thorpe & Showick Thorpe.
4. <https://prepinsta.com/>.
5. <https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm>.
6. <https://www.youtube.com/@FeelFreetoLearn/playlists>.

**Mapping of COs with POs and PSOs**

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



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24MAT46	NUMERICAL AND COMPUTATIONAL TECHNIQUES	Category	L	T	P	SL	C
		BSC	45	15	0	60	4
<b>SEMESTER - IV</b> ( COMMON TO II B.E. / B.Tech., - AE, BME, CE, CSE, CSD, CS, EEE, IOT,IT, MECH & SFE )							
<b>PREREQUISITE:</b> A fundamental knowledge of algebra, linear algebra, calculus, and differential equations is required for this course.							
<b>OBJECTIVES:</b> To develop the ability to apply numerical methods for solving algebraic and transcendental equations, systems of linear equations, interpolation, numerical differentiation and integration, and initial and boundary value problems.							
<b>UNIT - I</b>	<b>SOLUTIONS OF EQUATIONS AND EIGEN VALUE PROBLEMS</b>						<b>(12)</b>
Solutions to polynomial and transcendental equations - Newton Raphson Method - Solutions to simultaneous linear system of equations by Gauss Elimination Method - Gauss Seidel Method - Eigen value of a matrix by power method.							
<b>UNIT - II</b>	<b>INTERPOLATION AND APPROXIMATION</b>						<b>(12)</b>
Interpolation - Newton's Forward and Backward difference Interpolation Techniques (Equal intervals) - Newton's divided difference method - Lagrange's interpolation and Inverse Lagrange's interpolation methods (Unequal intervals).							
<b>UNIT - III</b>	<b>NUMERICAL DIFFERENTIATION AND INTEGRATION</b>						<b>(12)</b>
Numerical differentiation using Newton's Forward and Backward difference interpolation methods - Numerical integration by Trapezoidal rule - Simpson's 1/3 <sup>rd</sup> rule and Simpson's 3/8 <sup>th</sup> rule- Double integration using Trapezoidal and Simpson's rules.							
<b>UNIT - IV</b>	<b>INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS</b>						<b>(12)</b>
Ordinary Differential Equations (for solving first order equations) - Taylor's Series Method - Euler's Method - Modified Euler's Method - Fourth order Runge-Kutta method- Milne's Predictor and Corrector Method.							
<b>UNIT - V</b>	<b>BOUNDARY VALUE PROBLEMS IN PARTIAL DIFFERENTIAL EQUATIONS</b>						<b>(12)</b>
Classification of Partial Differential Equations - One dimension heat equation by Crank Nicolson's method - One dimensional wave equation - Two Dimensional Laplace and Poisson equations.							
<b>Lecture = 45, Tutorial = 15, Self Learning = 60; Total = 120 Periods</b>							
<b>COURSE OUTCOMES: At the end of the course, the students will be able to</b>							
COs	Course Outcome						Cognitive Level
CO1	Implement numerical techniques to solve equations, systems of linear equations and Eigen value problems						Apply
CO2	Assess Newton's interpolation methods to select the most suitable technique based on data spacing and the location of the interpolation point.						Analyze
CO3	Apply numerical methods to perform differentiation and integration						Apply
CO4	Apply numerical techniques to obtain approximate solutions of first order ordinary differential equations						Apply
CO5	Analyze and solve partial differential equations of heat and wave equations by using numerical approaches.						Analyze

**TEXT BOOKS:**

1. Dr. B. S.Grewal, "Numerical Methods in Engineering and Science" Khanna Publishers, New Delhi, 12th edition, 2016.
2. Dr. M.K. Venkataraman, "Numerical Methods in Science and Engineering", National Publishing Company, 4th edition, 2012.

**REFERENCES:**

1. Sukhendu Dey and Shishir Gupta "Numerical Methods", Tata McGraw Hill Publishing Company, 1st edition 2013.
2. V. Gerald 'Applied Numerical Analysis' Pearson Education, 6th edition, 2013.
3. P. Kandasamy, K. Thilagavathy, K. Gunavathy "Numerical Methods", S. Chand Company ,5<sup>th</sup> Edition.
4. S.R.K. Iyengar, R.K.Jain, "Numerical Methods", New Age International Publishers, 1st edition , 2014.
5. Rajasekaran.S, "Numerical Methods in Science and Engineering A Practical Approach", A.H.Wheeler and Company Private Limited, 2016.

**Mapping of COs with POs and PSOs**

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

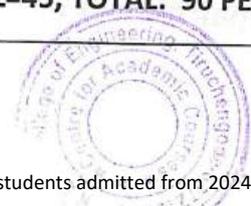
1 - Low, 2 - Medium, 3- High.

  
 DR. R.V.M. RANGARAJAN  
 CHAIRMAN  
 BOARD OF STUDIES (S&H)  
 K.S.R. COLLEGE OF ENGINEERING  
 TIRUCHENGODE - 637 215.



24ITT46	DATABASE MANAGEMENT SYSTEMS	Category	L	T	P	SL	C
		PCC	45	-	-	45	3
<b>(Common to CSE ,CSD, CSE(IOT),CSE(CS) &amp; IT)</b>							
<b>OBJECTIVES:</b>							
The objective of this course is to provide an understanding of the basic concepts of database systems, and aims to develop skills in SQL, and also emphasizes normalization techniques and the principles of transaction management, concurrency control, and recovery mechanisms.							
<b>UNIT - I</b>	<b>DATABASE CONCEPTS AND ARCHITECTURE</b>	<b>(9)</b>					
Introduction to Database Systems – Characteristics of DBMS – File System vs DBMS – Data Models – Three– Level Architecture – DBMS Components – Data Independence: Logical & Physical. ER Model: Entities – Attributes – Relationships – Weak Entities – Specialization – Generalization – Aggregation. Relational Model – Relations – Tuples – Attributes – Relational Algebra (select, project, join, union, intersection, difference).							
<b>UNIT - II</b>	<b>SQL</b>	<b>(9)</b>					
SQL Basics and Keys: Primary – Candidate – Super – Foreign Keys. CREATE – DROP – ALTER – INSERT– UPDATE – DELETE – Querying Databases :SELECT queries – WHERE – ORDER BY– GROUP BY – HAVING – DISTINCT– LIKE– IN – BETWEEN – Aggregate operators – NULL Values – Comparison using NULL Values – Joins – INNER– OUTER (LEFT, RIGHT, FULL) – CROSS – Subqueries (Nested & Correlated).							
<b>UNIT - III</b>	<b>ADVANCED SQL</b>	<b>(9)</b>					
Built– in Functions (String, Numeric, Date) – Views – Indexing – PL/SQL Basics – Cursors – Stored Procedures – Functions – Triggers.							
<b>UNIT - IV</b>	<b>SCHEMA REFINEMENT</b>	<b>(9)</b>					
Functional Dependencies – Non– Loss Decomposition Functional Dependencies – First Normal Form – Second Normal Form – Third Normal Form – Dependency Preservation – Boyce/Codd Normal Form – Multi– Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form– Decomposition – Lossless decomposition – Dependency preservation.							
<b>UNIT - V</b>	<b>CONCURRENCY CONTROL AND RECOVERY</b>	<b>(9)</b>					
Transactions: ACID Properties – Schedules and Serializability – Conflict & View Serializability. Concurrency Control Problems – Lost Update – Dirty Read – Unrepeatable Read – Phantom Read – Concurrency Control Techniques: Lock– Based Protocols (2PL, Strict 2PL) – Timestamp Ordering – Deadlocks (Prevention & Detection) – Database Recovery: Types of Failures – Recovery Techniques: Checkpoints – Log Based Recovery.							
<b>L= 45, T=0, P=0, SL=45, TOTAL: 90 PERIODS</b>							

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**COURSE OUTCOMES:**

At the end of the course, the students will be able to:

COs	Course Outcome	Cognitive Level
CO1	Describe the fundamental concepts, components, data models and key constraints of database management systems.	Understand
CO2	Develop and execute SQL queries to create, manipulate, and retrieve data efficiently from relational databases.	Apply
CO3	Implement PL / SQL procedures, functions and triggers to manipulate data on the database systems.	Apply
CO4	Apply functional dependencies and normalization techniques to design consistent and optimized relational database schemas.	Apply
CO5	Demonstrate and use the principles of transaction management, concurrency control, and recovery mechanisms in database systems.	Apply

**TEXT BOOKS:**

1. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education, 7th Edition, 2025.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Henry F. Korth, S. Sudharshan, Database System Concepts, 7th Edition, TataMcGraw Hill, 2021.

**REFERENCES:**

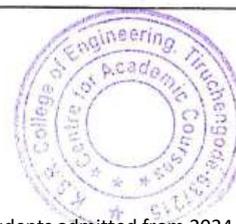
1. Hoffer, Venkataraman & Topi , Modern Database Management , 14<sup>th</sup> Edition, Pearson Education, 2025.
2. C.J.Date, A.Kannan and S.Swamynathan, An Introduction to Database Systems, Pearson Education, 8th Edition, 2012.
3. Raghu Ramakrishnan, Database Management Systems, Tata McGraw Hill, 4th Edition, 2010.
4. [https://onlinecourses.nptel.ac.in/noc22\\_cs91/preview](https://onlinecourses.nptel.ac.in/noc22_cs91/preview).

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	–	–	–	–	–	–	1	–	1	3	–
CO2	3	3	2	–	–	–	–	–	1	–	1	3	–
CO3	3	3	2	–	–	–	–	–	1	–	2	3	–
CO4	3	3	2	–	–	–	–	–	1	–	3	2	–
CO5	3	3	2	–	–	–	–	–	1	–	3	3	–
Avg.	3	3	2	–	–	–	–	–	1	–	2	3	–

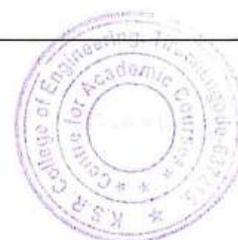
1-low, 2-medium, 3-high

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24CST46	DESIGN AND ANALYSIS OF ALGORITHMS	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
<b>(Common to CSE, IT, IoT, CSE(CS) and CSD)</b>							
<b>PREREQUISITE</b> Basic knowledge of programming concepts, simple data structures, basic mathematics, and logical problem-solving skills.							
<b>OBJECTIVES:</b> To learn algorithm fundamentals, study time and space complexity and apply common algorithmic techniques to solve computational problems.							
<b>UNIT - I</b>	<b>FUNDAMENTALS OF ALGORITHMS AND ALGORITHM ANALYSIS</b>	<b>(9)</b>					
Notion of Algorithm – Fundamentals of Algorithmic Problem Solving – Analysis Framework – Important Problem Types – Asymptotic Notations: Big O Notation, Omega $\Omega$ Notation and Theta $\Theta$ Notation – Mathematical analysis for Recursive and Non-recursive algorithms.							
<b>UNIT - II</b>	<b>BRUTE FORCE AND DIVIDE-AND-CONQUER</b>	<b>(9)</b>					
Brute Force: String Matching – Closest-Pair and Convex-Hull Problems – Exhaustive Search: Traveling Salesman Problem – Knapsack Problem – Assignment problem. Divide and Conquer: Master Theorem – Merge sort – Quick Sort – Binary search.							
<b>UNIT - III</b>	<b>DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE</b>	<b>(9)</b>					
Dynamic Programming: Warshall's algorithm – Floyd's algorithm – Optimal Binary Search Trees – Multistage Graph – Knapsack Problem. Greedy Technique: Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman Trees.							
<b>UNIT - IV</b>	<b>ITERATIVE IMPROVEMENT AND BACKTRACKING</b>	<b>(9)</b>					
Iterative improvement: Simplex Method – The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs – Stable Marriage Problem. Backtracking: N-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem.							
<b>UNIT - V</b>	<b>BRANCH AND BOUND ALGORITHMS AND COMPUTATIONAL COMPLEXITY</b>	<b>(9)</b>					
Branch and Bound: Assignment problem – Knapsack Problem – Travelling Salesman Problem. Computational Complexity: P and NP Problems – NP Complete Problems – Approximation Algorithms for NP Hard Problems: Travelling Salesman Problem and Knapsack problem.							
<b>L:45, T:0, P:0, SL:45, TOTAL: 90 PERIODS</b>							
<b>COURSE OUTCOMES:</b> At the end of the course, the students will be able to:							

  
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COs	Course Outcome	Cognitive Level
CO1	Comprehend the fundamentals of algorithms and analyze their efficiency using asymptotic notations.	Understand
CO2	Employ brute force and divide-and-conquer techniques to solve standard algorithmic problems.	Apply
CO3	Implement dynamic programming and greedy methods to solve optimization problems.	Apply
CO4	Apply iterative improvement and backtracking techniques to solve problems.	Apply
CO5	Demonstrate optimization problems using Branch and Bound and approximation algorithms covering P, NP, and NP-Complete problems.	Apply

**TEXT BOOKS:**

1. Anany Levitin, Introduction to The Design and Analysis of Algorithms, Pearson Education, India, Third Edition, 2017.
2. A.V. Aho, J.E. Hopcroft and J.D. Ullman, The Design and Analysis of Computer Algorithms, Pearson Education Asia, India, Fourth Edition, 2010.

**REFERENCES:**

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, MIT Press, Fourth Edition, 2022
2. S. Sridhar, Design and Analysis of Algorithms, Oxford University Press, Second Edition, 2023
3. Robert Sedgewick, Philippe Flajolet, An Introduction to the Analysis of Algorithms, Addison-Wesley, USA, Second Edition, 2013.
4. Sara Baase and Allen Van Gelder, Computer Algorithms: Introduction to Design and Analysis, Pearson Education, India, Third Edition, 2010.

**Mapping of COs with POs and PSOs**

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	1	3	2
CO2	3	3	2	-	-	-	-	-	-	-	1	3	2
CO3	3	3	2	-	-	-	-	-	-	-	1	3	2
CO4	3	3	2	-	-	-	-	-	-	-	1	3	2
CO5	3	3	2	-	-	-	-	-	-	-	1	3	2

1-low, 2-medium, 3-high

  
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24CBT41	CRYPTOGRAPHY	Category	L	T	P	SL	C
		PCC	45	0	0	45	3
<b>PREREQUISITE:</b> Basic knowledge of foundational mathematics and fundamental concepts of encryption, authentication, and number-theory based algorithms.							
<b>OBJECTIVES:</b> To provide foundational and advanced understanding of classical, symmetric, and asymmetric cryptography, along with hash functions, digital signatures, and key-management mechanisms.							
<b>UNIT – I</b>	<b>CLASSICAL ENCRYPTION</b>	<b>(9)</b>					
Cryptography – Cryptanalysis - Basic concepts Security attacks - services and mechanisms - Characteristics of good ciphers - Security Standards - Classical encryption techniques: Symmetric cipher model - Substitution techniques and Transposition techniques.							
<b>UNIT – II</b>	<b>SYMMETRIC AND STREAM CIPHERS</b>	<b>(9)</b>					
Block cipher principles - Data Encryption Standard (DES)- Fields and finite field arithmetic - Advanced Encryption Standard (AES) - Block cipher modes of operation - Principles of random number generation - Random number generators - Stream ciphers - RC4.							
<b>UNIT – III</b>	<b>ASYMMETRIC CIPHERS</b>	<b>(9)</b>					
Number theory concepts - Euclidean algorithm -Modular arithmetic - Prime numbers Fermat's and Euler's theorem- Discrete logarithms - Principles of public key cryptosystems -RSA algorithm - Diffie - Hellman key exchange -ElGamal cryptographic system							
<b>UNIT – IV</b>	<b>HASH FUNCTION AND DIGITAL SIGNATURE</b>	<b>(9)</b>					
Hash function: Applications, Requirements - Secure Hash Algorithm (SHA) - Message authentication codes: Requirements, functions - Hash based Message Authentication Codes (HMAC) signature: Properties - ElGamal digital signature scheme - Digital Signature Standard (DSS).							
<b>UNIT – V</b>	<b>KEY MANAGEMENT AND USER AUTHENTICATION</b>	<b>(9)</b>					
Key management and distribution – Symmetric Key Distribution Using Symmetric Encryption & Asymmetric Encryption - X.509 certificate - Public key infrastructure: PKIX Management Functions-PKIX Management Protocols - User authentication - Kerberos protocol – Steganography							
<b>COURSE OUTCOMES:</b> Upon completion of the course, the students will be able to:							
Course Outcome	Description	Bloom's Taxonomy					
CO1	Illustrate the classical encryption techniques for providing confidentiality service	Understand					
CO2	Build symmetric key algorithms and stream ciphers for encrypting text and multimedia data	Apply					
CO3	Apply number theory concepts to design asymmetric key algorithms for providing confidentiality and key exchange services	Apply					
CO4	Use hash function and digital signature for protecting digital documents	Apply					
CO5	Analyze key management and user authentication protocols for providing key sharing and authentication services	Analyze					

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TEXT BOOKS:													
1	William Stallings, "Cryptography and Network Security Principles and Practices", Pearson Education, 8th Edition, 2022.												
2	Douglas R. Stinson, Maura B. Paterson, "Cryptography - Theory and Practice", Chapman & Hall /CRC Press (Taylor & Francis Group), 4th Edition, 2019												
REFERENCES:													
1	William Easttom, "Modern Cryptography ", Applied Mathematics for Encryption and Information Security, 1st Edition, 2021												
2	Jonathan Katz and Yehuda Lindell, "Introduction to Modern Cryptography", CRC PRESS New York, 3rd Edition, 2020												
3	William Stallings. "Cryptography and Network Security Principles and Practices", Pearson Education, 6th Edition, 2014.												
4	Behrouz A Forouzan and Debdeep Mukhopadhyay, "Cryptography and Network Security", Tala McGraw Hill, New Delhi, 2011.												
5	Douglas R Stinson, "Cryptography - Theory and Practice", Chapman and Hall / CRC Press, New York, 2013.												
Mapping of COs with POs and PSOs													
COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	-	2	-	1	1	-	-	2	3
CO2	3	3	2	-	-	2	-	1	1	-	-	2	3
CO3	3	3	2	-	-	2	-	1	1	-	-	2	3
CO4	3	3	2	-	-	2	-	1	1	-	-	2	3
CO5	3	3	3	2	-	3	-	1	1	-	-	2	3
1 - low, 2 - medium, 3 - high, '-' - no correlation													

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24CBI46	ADVANCED JAVA PROGRAMMING	Category	L	T	P	SL	C	
		PCC	15	0	90	15	4	
<b>(Common to CSE, CSE-CS, CSD, IT, CSE- IoT)</b>								
<b>PREREQUISITE:</b> Basic knowledge of Java programming concepts such as classes, objects, inheritance, and exception handling are required.								
<b>OBJECTIVES:</b> This course provides knowledge of Java Collections, server-side programming, modern Java features, and design patterns. It helps students develop efficient and maintainable Java applications.								
<b>UNIT – I</b>	<b>COLLECTIONS FRAMEWORK- I</b>							<b>(21)</b>
Java Arrays– Collections Overview – Collections Framework – Collection Interface – Collections and Generic, List, Cursors, Iterators, Vector <span style="float: right;"><b>(Theory-3)</b></span>								
<b>List of Exercise:</b>								
<ol style="list-style-type: none"> <li>Analyze the use of one-dimensional and multi-dimensional arrays by writing a Java program to store, access, and manipulate data elements.</li> <li>Develop a Java program using ArrayList to perform insertion, deletion, and searching operations.</li> <li>Apply the Iterator and ListIterator interfaces in a Java program to traverse and modify elements of a List.</li> <li>Implement a Java program using Vector and show thread-safe operations.</li> <li>Write a Java program to demonstrate Enumeration cursor on a Vector. <span style="float: right;"><b>(Laboratory-18)</b></span></li> </ol>								
<b>UNIT – II</b>	<b>COLLECTIONS FRAMEWORK- II</b>							<b>21</b>
Set - Basic Set and Extended Set. Comparable and Comparator - Sorting objects, Queue, Map, Concurrent Collections, Streams <span style="float: right;"><b>(Theory-3)</b></span>								
<b>List of Exercise:</b>								
<ol style="list-style-type: none"> <li>Apply HashSet, LinkedHashSet, and TreeSet collections in a Java program to store a set of elements and demonstrate their behavior with respect to insertion order, sorting, and uniqueness.</li> <li>Develop a Java program to sort objects using Comparable and Comparator interfaces.</li> <li>Analyze the behavior of a PriorityQueue by writing a Java program to perform queue operations such as insertion, deletion, and traversal, and observe the element ordering.</li> <li>Implement a Java program using HashMap and TreeMap.</li> <li>Write a Java program to demonstrate Java Streams for filtering and mapping collections. <span style="float: right;"><b>(Laboratory-18)</b></span></li> </ol>								
<b>UNIT – III</b>	<b>SERVER-SIDE PROGRAMMING</b>							<b>21</b>
Java Regex API - Matcher class - Pattern class - PatternSyntaxException – POSIX Standards JDBC - JDBC Drivers – JDBC Components – DriverManager, Driver, Connection, Statement, ResultSet, Handling SQL Exception - Prepared Statement – Callable Statement – Scrollable ResultSet <span style="float: right;"><b>(Theory-3)</b></span>								
<b>List of Exercise:</b>								
<ol style="list-style-type: none"> <li>Write a Java program using Pattern and Matcher classes to validate email IDs.</li> <li>Construct a Java program that demonstrates the occurrence and handling of PatternSyntaxException in regular expressions.</li> <li>Apply JDBC concepts by writing a Java program to establish connectivity between a Java application and a database.</li> <li>Implement CRUD operations on a database using PreparedStatement.</li> <li>Develop a Java program using Scrollable ResultSet. <span style="float: right;"><b>(Laboratory-18)</b></span></li> </ol>								
<b>UNIT – IV</b>	<b>LAMBDA AND ANNOTATIONS</b>							<b>21</b>
Wrapper Classes – Autoboxing- Unboxing –Lambda Expressions – Method References – functional Interfaces Javadocs, Annotations – Assertions <span style="float: right;"><b>(Theory-3)</b></span>								
<b>List of Exercise:</b>								
<ol style="list-style-type: none"> <li>Write a Java program to demonstrate wrapper classes with autoboxing and unboxing.</li> <li>Implement lambda expressions for arithmetic operations.</li> <li>Apply method references in a Java program to implement functional interfaces and simplify lambda expressions.</li> </ol>								

4. Develop a Java program using functional interfaces.
5. Apply custom annotations and assertions in a Java program to define metadata and validate program conditions during execution. **(Laboratory-18)**

<b>UNIT – V</b>	<b>DESIGN PATTERNS</b>	<b>21</b>
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Design Patterns - Creational – Structural and Behavioural Design Patterns - Singleton – Factory Method Pattern - Adapter Pattern – Proxy - Iterator, MVC. **(Theory-3)**

**List of Exercise:**

1. Implement the Singleton Design Pattern in Java.
2. Write a Java program using Factory Method Pattern.
3. Build a Java application that demonstrates the use of the Adapter Design Pattern to enable compatibility between incompatible interfaces.
4. Construct a Java application implementing the Proxy Design Pattern using a real-world example to control access to an object.
5. Develop a Java application using the MVC architectural pattern. **(Laboratory-18)**

**COURSE OUTCOMES:**

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

Course Outcome	Description	Bloom's Taxonomy
CO1	Interpret Java Arrays and the Collections Framework, including Generics, Lists, Vectors, and basic traversal methods such as iterators.	Understand
CO2	Use Set, Queue, and Map interfaces with Comparable, Comparator, and streams to solve data processing problems.	Apply
CO3	Construct server-side Java applications that perform database interaction using JDBC and regular expressions.	Apply
CO4	Examine Java features such as lambda expressions, functional interfaces, and annotations to identify their roles and interactions in program design.	Analyze
CO5	Analyze suitable design patterns to achieve reusability, scalability, and maintainability in Java applications.	Analyze

**TEXT BOOKS:**

1	Herbert Schildt, "Java – The Complete Reference", McGraw-Hill Education, 13th Edition, 2023
2	Modern Java in Action by Raoul-Gabriel Urma, Mario Fusco & Alan Mycroft, Manning Publications, 2nd Edition, 2023

**REFERENCES:**

1	Scott Oaks, High-Performance Java: Strategies and Best Practices for Developing High Performance Java Applications, Publisher: Packt Publishing, 1st Edition, 2025
2	Y. Daniel Liang, Introduction to Java Programming and Data Structures, Comprehensive Version, Pearson, 12th Edition, 2024
3	Cay S. Horstmann, Core Java Volume I – Fundamentals, Pearson, 12th Edition, 2024
4	Joshua Bloch, Effective Java, Addison-Wesley, 4th Edition, 2023
5	Paul Deitel & Harvey Deitel, Java: How to Program, Pearson, 12th Edition, 2022

**Mapping of COs with POs and PSOs**

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

1 - low, 2 - medium, 3 - high, '-' - no correlation

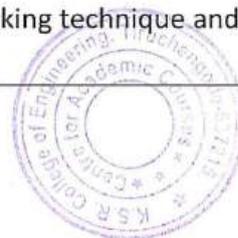
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24CSP46	DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY	Category	L	T	P	C
		PCC	0	0	60	2
<b>(Common to CSE, IT, IoT, CSE(CS) and CSD)</b>						
<b>PREREQUISITE</b>						
Students should have a basic understanding of programming concepts, data structures, and mathematical foundations such as logic and discrete mathematics.						
<b>OBJECTIVES:</b>						
To enable students to design, implement and analyze fundamental algorithmic techniques and evaluate their time complexities while solving classical computational problems efficiently.						
<b>List of Exercise/Experiments:</b>						
<ol style="list-style-type: none"> <li>1. Determine the maximum element in a given array and examine its time complexity in best, average, and worst cases using Big-O notation.</li> <li>2. Examine the performance of Linear Search by computing comparison counts for best, average, and worst cases.</li> <li>3. Construct the Binary Search algorithm using the Divide and Conquer strategy and assess its best, average, and worst-case time complexities.</li> <li>4. Apply the Brute Force String Matching technique to locate a pattern in a given text and illustrate the comparison process.</li> <li>5. Formulate a solution for the Traveling Salesman Problem using exhaustive search and demonstrate how all possible tours are explored to find the minimum cost.</li> <li>6. Develop Merge Sort and Quick Sort algorithms using the Divide and Conquer method and analyze their time complexities.</li> <li>7. Solve the 0/1 Knapsack Problem using the Dynamic Programming approach and display the maximum achievable profit.</li> <li>8. Compute all-pairs shortest paths in a weighted graph using Floyd's Algorithm and analyze the path cost updates.</li> <li>9. Apply Warshall's Algorithm to determine the transitive closure of a directed graph and interpret the reachability matrix.</li> <li>10. Derive the Minimum Spanning Tree of a connected graph using Prim's Algorithm and show how the greedy choice ensures minimum cost.</li> <li>11. Design a solution to obtain the shortest path from a source vertex to all other vertices in a weighted graph using Dijkstra's Algorithm.</li> <li>12. Apply the Stable Marriage Problem algorithm to find a stable matching between two equal-sized sets.</li> <li>13. Compute the maximum flow in a given flow network using an appropriate algorithm and determine the maximum possible flow value.</li> <li>14. Demonstrate the N-Queens Problem using the Backtracking technique and list all possible valid solutions.</li> </ol>						

  
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15. Optimize the Assignment Problem using the Branch and Bound technique and identify the minimum cost assignment.														
<b>L:0, T:0, P:60, SL: 0, TOTAL: 60 PERIODS</b>														
<b>COURSE OUTCOMES:</b>														
At the end of the course, the students will be able to:														
COs	Course Outcome												Cognitive Level	
CO1	Apply fundamental algorithmic concepts and asymptotic notations to analyze the efficiency of algorithms.												Apply	
CO2	Implement classic algorithm design techniques such as brute force, divide and conquer, dynamic programming, greedy, and backtracking methods.												Apply	
CO3	Demonstrate the use of graph algorithms to solve shortest path, minimum spanning tree, and maximum flow problems.												Apply	
CO4	Design optimized solutions for combinatorial and optimization problems using branch and bound and approximation techniques.												Apply	
CO5	Deploy algorithmic solutions by evaluating their time and space complexities to select the most efficient approach for a given problem.												Apply	
<b>TEXT BOOKS:</b>														
<ol style="list-style-type: none"> <li>1. Anany Levitin, Introduction to The Design and Analysis of Algorithms, Pearson Education, India, Third Edition, 2017.</li> <li>2. A.V. Aho, J.E. Hopcroft and J.D. Ullman, The Design and Analysis of Computer Algorithms, Pearson Education Asia, India, Fourth Edition, 2010.</li> </ol>														
<b>Mapping of COs with POs and PSOs</b>														
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	1	-	-	-	1	-	-	2	3	2
CO2	3	3	2	-	1	-	-	-	1	-	-	2	3	2
CO3	3	3	2	-	1	-	-	-	1	-	-	2	3	2
CO4	3	3	2	-	1	-	-	-	1	-	-	2	3	2
CO5	3	3	2	-	1	-	-	-	1	-	-	2	3	2
1-low, 2-medium, 3-high														

  
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24ITP46	DATABASE MANAGEMENT SYSTEMS LABORATORY	Category	L	T	P	SL	C
		PCC	-	-	60	60	2
<b>(Common to CSE ,CSD, CSE(IOT),CSE(CS) &amp; IT)</b>							
<b>OBJECTIVES:</b>							
<p>The objectives of this course focus on SQL-based schema creation, data manipulation, and retrieval using joins, subqueries, and views. It also covers stored procedures, triggers, transactions, normalization, and hands-on SQL mini projects.</p>							
<b>List of Exercise/Experiments:</b>							
<ol style="list-style-type: none"> <li>1. DDL Schema Creation with Primary and Foreign Key Constraints.</li> <li>2. DML Data Insertion, Modification, and Deletion Operations.</li> <li>3. Basic SQL Retrieval Queries.</li> <li>4. Relational JOIN Query Execution.</li> <li>5. Sub query and Nested Query Execution.</li> <li>6. VIEW Creation and Querying.</li> <li>7. Stored Procedure Creation and Execution.</li> <li>8. Transaction Management using BEGIN, COMMIT, and ROLLBACK (TCL).</li> <li>9. Trigger Implementation for Data Validation or Logging.</li> <li>10. Database Authorization using GRANT and REVOKE Privileges (DCL).</li> <li>11. Table Normalization – Apply 1NF, 2NF, and 3NF to Remove Data Redundancy.</li> <li>12. SQL Mini Project – CRUD-based Application Development.</li> </ol> <p>Sample Applications for mini project using SQL :</p> <ul style="list-style-type: none"> <li>● Student Information System</li> <li>● Hospital Management System</li> <li>● Library Management System</li> <li>● Inventory Control System</li> <li>● Bus Ticket Booking System</li> <li>● Employee Attendance &amp; Payroll System</li> <li>● ATM Transaction Tracking System</li> </ul>							
<b>L= 0, T=0, P=60, SL=0, TOTAL: 60 PERIODS</b>							

  
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<b>COURSE OUTCOMES:</b>													
<b>At the end of the course, the students will be able to:</b>													
<b>COs</b>	<b>Course Outcome</b>											<b>Cognitive Level</b>	
<b>CO1</b>	Execute DDL and DML commands to design and manage relational database schemas with different key constraints.											Apply	
<b>CO2</b>	Develop SQL queries to retrieve and manipulate data using joins, sub queries, and views.											Apply	
<b>CO3</b>	Implement advanced SQL concepts such as stored procedures, triggers, transactions, and database authorization.											Apply	
<b>CO4</b>	Apply Normalization concepts in database tables to eliminate redundancy and ensure data consistency.											Apply	
<b>CO5</b>	Develop and deploy applications by SQL for effective database management.											Apply	
<b>Mapping of COs with POs and PSOs</b>													
<b>COs/ POs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	3	2	–	2	–	1	–	1	–	1	3	–
<b>CO2</b>	3	3	2	–	3	–	1	–	1	–	1	3	–
<b>CO3</b>	3	3	2	–	3	–	1	–	1	–	1	2	–
<b>CO4</b>	3	3	2	–	3	–	1	–	1	–	1	3	–
<b>CO5</b>	3	3	2	–	3	–	1	–	1	–	1	3	–
<b>Avg.</b>	3	3	2	–	3	–	1	–	1	–	1	3	–
1-low, 2-medium, 3-high													

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24CSP47	DESIGN STUDIO - II	Category	L	T	P	SL	C
		PCC	0	0	30	0	1
<b>Common To CSE, CSD, CSE(CS), CSE(IOT) and IT</b>							
<b>PREREQUISITE</b> Students must have basic knowledge on programming principles, such as variables, simple data types, control structures and Object Oriented Programming with problem solving and logical thinking skills.							
<b>OBJECTIVES:</b> Basic knowledge of programming, AI/ML, IoT, databases and cloud platforms is required, along with an understanding of cybersecurity and application domains like agriculture and healthcare.							
<b>List of Problem Statements:</b> <ol style="list-style-type: none"> <li>Smart Community Health Monitoring and Early Warning System for Water-Borne Diseases in Rural Northeast India.</li> <li>Smart Tourist Safety Monitoring &amp; Incident Response System using AI, Geo-Fencing, and Blockchain based Digital ID.</li> <li>Low-Cost smart transportation solution for Agri produce from remote farms to nearest motorable road in NER Region.</li> <li>Image based breed recognition for cattle and buffaloes of India.</li> <li>Image based Animal Type Classification for cattle and buffaloes.</li> <li>Development of a Digital Farm Management Portal for implementing Biosecurity measures in Pig and Poultry Farms.</li> </ol>							
<b>L=0, T=0, P=30, SL=0, TOTAL: 30 PERIODS</b>							
<b>COURSE OUTCOMES:</b> At the end of the course, the students will be able to:							
COs	Course Outcome	Exper iment	Cognitive Level				
CO1	Demonstrate advanced smart health systems, intelligent tourist safety frameworks, optimized agricultural logistics, and digital farm management solutions, emphasizing their broader societal and technological impact.	1	Apply				
CO2	Apply IoT devices, sensors, geo-fencing, and cloud technologies to build functional prototypes for real-time monitoring and alert systems	2,3	Apply				
CO3	Analyze image-based datasets of cattle and livestock to develop AI/ML models for breed recognition and animal type classification	4	Analyze				

  
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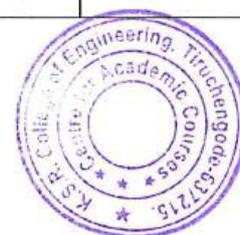
CO4	Integrate and analyze AI, blockchain, and cloud platforms to build smart solutions for health surveillance, safety monitoring, and biosecurity management.											5	Create
CO5	Evaluate the performance, accuracy, reliability, and scalability of developed smart systems using appropriate metrics and validation techniques.											6	Evaluate
Mapping of COs with POs and PSOs													
COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO 1	PSO2
CO1	3	3	2	-	-	-	-	3	3	3	3	-	-
CO2	3	3	2	-	-	-	-	3	3	3	3	-	-
CO3	3	3	3	2	-	-	-	3	3	3	3	-	-
CO4	3	3	3	2	-	-	-	3	3	3	3	-	-
CO5	3	3	3	2	-	-	-	3	3	3	3	-	-
1-low, 2-medium, 3-high													

  
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24SDP49	SOFT SKILLS DEVELOPMENT – IV	Category	L	T	P	SL	C
		EEC	0	0	30	0	1
<b>(Common to All Branches)</b>							
<b>OBJECTIVES:</b>							
To the concept of aptitude and make them aware of its growing importance in academics, competitive exams, and professional life. In addition, it seeks to build a strong foundation in English grammar to improve language and communication skills.							
<b>UNIT - I</b>	<b>TIME AND WORK</b>						(6)
Relationship Between Time and Work – Efficiency Calculation – Wages – Alternate Days – Pipes and Cisterns – Chain Rule.							
<b>UNIT - II</b>	<b>PERMUTATION COMBINATION AND PROBABILITY</b>						(6)
Permutation Based on Words and Numbers – Combination Based on Committee, Balls and Cards – Probability Based on Persons, Balls, Cards, Dice and Coins.							
<b>UNIT - III</b>	<b>SIMPLE INTEREST AND COMPOUND INTEREST</b>						(6)
Introduction to Principal, Interest and Time – Simple Interest Calculation – Compound Interest: Compounded Annually, Half-yearly and quarterly.							
<b>UNIT - IV</b>	<b>LOGICAL REASONING</b>						(6)
Syllogism – Clocks – Calendar.							
<b>UNIT - V</b>	<b>VERBAL ABILITY</b>						(6)
Tenses – Articles – Subject Verb Agreement – Error Spotting – Essay Writing.							
<b>TOTAL: 30 PERIODS</b>							
<b>COURSE OUTCOMES:</b>							
<b>At the end of the course, the students will be able to:</b>							
COs	Course Outcome	Cognitive Level					
CO1	Apply time and work concepts to solve problems on efficiency, wages, alternate days and pipes & cisterns, and chain rule.	Apply					
CO2	Develop problem solving on permutations, combinations, and probability involving words, objects, and standard.	Understand					
CO3	Apply concepts of principal, rate, and time to calculate simple and compound interest under various compounding periods.	Apply					
CO4	Demonstrate logical reasoning to solve problems related to syllogisms, clocks, and calendars effectively.	Understand					
CO5	Demonstrate grammatical accuracy and coherence in writing by applying rules of tenses, articles, subject-verb agreement.	Understand					

  
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**TEXT BOOKS:**

1. R S Aggarwal, "Quantitative Aptitude for Competitive Examinations".
2. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations".
3. Nishit K. Sinha, "Logical Reasoning and Data Interpretation for CAT".
4. R.S. Agarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning".
5. Wren & Martin, "High School English Grammar & Composition".

**REFERENCES:**

1. Arun Sharma, Quantitative Aptitude for CAT, 11e, 2025.
2. Arun Sharma, Logical Reasoning for CAT, 7e, 2025.
3. English for Competitive Examinations – by Edgar Thorpe & Showick Thorpe.
4. <https://prepinsta.com/>.
5. <https://www.geeksforgeeks.org/quantitative-aptitude/?ref=shm>.
6. <https://www.youtube.com/@FeelFreetoLearn/playlists>.

**Mapping of COs with POs and PSOs**

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

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