



**REGULATIONS 2024**  
**CHOICE BASED CREDIT SYSTEM**  
**B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**

**Vision**

To be a globally recognized hub for innovation and excellence in Artificial Intelligence education and research, empowering students to pioneer advancements in AI technologies and solve real-world problems for the betterment of society.

**Mission**

- **Deliver Advanced AI Education:** To provide a comprehensive and cutting-edge curriculum that equips students with in-depth knowledge of Artificial Intelligence, machine learning, and data science, fostering their ability to develop intelligent systems and solutions.
- **Foster Research and Innovation:** To promote a dynamic research environment where students and faculty collaborate to explore novel AI technologies and applications, addressing complex challenges across diverse domains.
- **Ethical AI Development:** To instill ethical principles in the design and application of AI, ensuring students understand the societal impact and are responsible for creating AI systems that are fair, transparent, and beneficial to humanity.
- **Prepare Industry-Ready Professionals:** To nurture creativity, problem-solving skills, and interdisciplinary collaboration, preparing students to excel in AI-driven industries and contribute to global technological advancement.
- **Encourage Lifelong Learning:** To inspire a culture of continuous learning and innovation, empowering students to adapt to the rapid evolution of AI technologies and maintain their competitive edge throughout their careers.

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

Bachelor of Artificial Intelligence and Data Science curriculum is designed to impart Knowledge, Skill and Attitude on the graduates to

<b>PEO1:</b>	Utilize their proficiencies in the fundamental knowledge of basic sciences, mathematics, Artificial Intelligence, data science and statistics to build systems that require management and analysis of large volumes of data
<b>PEO2:</b>	Advance their technical skills to pursue pioneering research in the field of AI and Data Science and create disruptive and sustainable solutions for the welfare of ecosystems
<b>PEO3:</b>	Think logically, pursue lifelong learning and collaborate with an ethical attitude in a multidisciplinary team
<b>PEO4:</b>	Design and model AI based solutions to critical problem domains in the real world
<b>PEO5:</b>	Exhibit innovative thoughts and creative ideas for effective contribution towards economy building

## **PROGRAM OUTCOMES (POs)**

**Students graduating from Artificial Intelligence and Data Science Engineering shall be able to:**

**PO1 Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization for the solution of complex engineering problems.

**PO2 Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development.

**PO3 Design/ development of solutions:** 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.

**PO4 Conduct investigations of complex problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions.

**PO5 Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems.

**PO6 The Engineer and the World:** 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.

**PO7 Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and

inclusion; adhere to National & International laws.

**PO8 Individual and Collaborative Team Work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

**PO9 Communication:** 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 Project management and finance:** 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 Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

**PSO1:** Apply AI and Data Analytics concepts, tools, and techniques to derive actionable insights and foresights for effective decision-making in domains such as business, governance, and engineering, while addressing complex societal challenges.

**PSO2:** Demonstrate research competence and advanced skills in data visualization, knowledge engineering, and cutting-edge AI technologies to develop innovative solutions for critical societal needs and manage complex real-world projects.

**PEO / PO MAPPING:**

PEOs	PO’s											PSOs	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	3	2	2	3	2	1			2	2	3	2
2	3	3	3	3	3	3	2	2	2	2	3	3	3
3	2	2	2	2	2	3	3	3	3	2	3	2	2
4	3	3	3	3	3	2	2	2	2	3	3	3	3
5	2	2	3	2	3	2	2	2	2	3	3	2	3







# SRI RANGANATHAR

## INSTITUTE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution)



(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai)  
Athipalayam, Coimbatore - 641 110. website: sriet.ac.in, Ph: 0422 - 2697792

### REGULATIONS 2024

### CHOICE BASED CREDIT SYSTEM

### B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

### CURRICULUM AND SYLLABI FOR I TO VIII SEMESTERS

#### SEMESTER – I

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>MANDATORY NON CREDIT COURSE</b>								
1	24IP3151	Induction Program	MNC	Two Weeks				0
<b>THEORY COURSES</b>								
2	24HS3151	Functional English	HSMC	2	0	0	2	2
3	24MA3151	Matrices and Calculus	BSC	3	1	0	4	4
4	24GE3052	Problem Solving and Python Programming	ESC	3	0	0	3	3
5	24GE3051	Engineering Graphics	ESC	2	2	0	4	4
6	24GE3152	Heritage of Tamil	HSMC	1	0	0	1	1
<b>THEORY COURSE WITH LABORATORY COMPONENT</b>								
7	24CY3051	Engineering Chemistry	BSC	3	0	2	5	4
<b>LABORATORY COURSES</b>								
8	24GE3072	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
<b>PROFESSIONAL DEVELOPMENT COURSE</b>								
9	24ES3151	Basic Computing Skills for Engineers	EEC	0	0	2	2	1
10	24GE3172	Soft Skills - 1	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>14</b>	<b>3</b>	<b>10</b>	<b>27</b>	<b>22</b>

**SEMESTER – II**

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY COURSES</b>								
1	24HS3252	Professional English	HSMC	2	0	0	2	2
2	24MA3252	Linear Algebra, Statistics and Numerical Methods	BSC	3	1	0	4	4
3	24AD3251	Data Structures Design	ESC	3	0	0	3	3
4	24BE3051	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
5	24GE3252	Tamils and Technology	HSMC	1	0	0	1	1
6		NCC Credit Course Level 1 #	-	2#	0	0	2#	2#
<b>THEORY CUM PRACTICAL</b>								
7	24PH3051	Engineering Physics	BSC	3	0	2	5	4
<b>PRACTICALS</b>								
8	24GE3071	Engineering Practice Laboratory	ESC	0	0	4	4	2
9	24AD3271	Data Structures Design laboratory	ESC	0	0	4	4	2
<b>PROFESSIONAL DEVELOPMENT COURSE</b>								
10	24GE3272	Soft skill - II	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>15</b>	<b>1</b>	<b>12</b>	<b>28</b>	<b>22</b>

# NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

**SEMESTER III**

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY COURSES</b>								
1	24MA3391	Probability and Statistics	BSC	3	1	0	4	4
2	24AL3391	Artificial Intelligence	PCC	3	0	0	3	3
3	24ME3492	Fundamentals of Programming	PCC	3	0	0	3	3
<b>THEORY CUM PRACTICAL</b>								
4	24CS3351	Digital Principles and System Design	ESC	3	0	2	5	4

5	24AD3351	Design and Analysis of Algorithms	PCC	3	0	2	5	4
6	24AD3301	Data Exploration and Visualization	PCC	3	0	2	5	4
<b>PRACTICALS</b>								
7	24AD3311	Artificial Intelligence Laboratory	PCC	0	0	3	3	1.5
8	24ME3495	Fundamentals Of Programming Laboratory	PCC	0	0	3	3	1.5
9	24GE3361	Advanced Logical Thinking <sup>§</sup>	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>18</b>	<b>1</b>	<b>14</b>	<b>33</b>	<b>26</b>

**§ Skill Based Course**

**SEMESTER IV**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1	24MA3054	Discrete Mathematics	BSC	3	1	0	4	4
2	24AL3451	Machine Learning	PCC	3	0	0	3	3
3	24AD3391	Database Design and Management	PCC	3	0	0	3	3
4	24GE3451	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
5		NCC Credit Course Level 2 <sup>#</sup>		3 <sup>#</sup>	0	0	3 <sup>#</sup>	3 <sup>#</sup>
<b>THEORY CUM PRACTICAL</b>								
6	24CS3591	Computer Networks	PCC	3	0	2	5	4
7	24AL3452	Operating Systems	PCC	3	0	2	5	4
<b>PRACTICALS</b>								
8	24AD3461	Machine Learning Laboratory	PCC	0	0	3	3	1.5
9	24AD3381	Database Design and Management Laboratory	PCC	0	0	3	3	1.5
<b>TOTAL</b>				<b>17</b>	<b>1</b>	<b>10</b>	<b>28</b>	<b>23</b>

**# NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.**

**SEMESTER V**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1	24AD3501	Deep Learning	PCC	3	0	0	3	3
2	24CW3551	Data and Information Security	PCC	3	0	0	3	3
3	24CS3551	Distributed Computing	PCC	3	0	0	3	3
4		Professional Elective – I	PEC	-	-	-	-	3
5		Professional Elective – II	PEC	-	-	-	-	3
6		Mandatory Course – I <sup>&amp;</sup>	MC	3	0	0	3	Non-Credit Course
<b>THEORY CUM PRACTICAL</b>								
7	24CCS334	Big Data Analytics	PCC	2	0	2	4	3
<b>PRACTICALS</b>								
8	24AD3511	Deep Learning Laboratory	PCC	0	0	4	4	2
9	24AD3512	Summer Internship	EEC	0	0	0	0	2
<b>TOTAL</b>				-	-	-	-	<b>22</b>

**& Mandatory Course-I is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-I**

#### SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1		Open Elective – I*	OEC	-	-	-	-	3
2		Professional Elective – II	PEC	-	-	-	-	3
3		Professional Elective – III	PEC	-	-	-	-	3
4		Professional Elective – IV	PEC	-	-	-	-	3
5		Mandatory Course-II <sup>&amp;</sup>	MC	3	0	0	3	0
6		NCC Credit Course Level 3 #		3 #	0	0	3	3 #
<b>THEORY CUM PRACTICAL</b>								
7	24CCS356	Object Oriented Software Engineering	PCC	3	0	2	5	4
8	24CS3691	Embedded Systems and IoT	PCC	3	0	2	5	4
<b>PRACTICALS</b>								

9		Mini-Project	EEC	0	0	2	2	1
<b>TOTAL</b>				-	-	-	-	<b>21</b>

**& Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under MC-II)**

**\*Open Elective – I Shall be chosen from the list of open electives offered by other Programmes**

**# NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA**

**SEMESTER VII / VIII\***

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1	24GE3791	Human Values and Ethics	HSMC	3	0	0	3	2
2		Professional Elective – V	PEC	-	-	-	-	3
3		Open Elective – II**	OEC	-	-	-	-	3
4		Open Elective – III**	OEC	-	-	-	-	3
<b>PRACTICALS</b>								
5	24AD3801	Project Work – Phase-I	EEC	0	0	2	2	2
<b>TOTAL</b>				-	-	-	-	<b>13</b>

**#Two weeks Summer Internship carries one credit and it will be done during VI semester summer vacation and same will be evaluated in VII semester.**

**\*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.**

**\*\* Open Elective II - III (Shall be chosen from the list of open electives offered by other Programmes)**

**SEMESTER VIII / VII\***

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1		Elective – Management #	HSMC	-	-	-	-	3
2		Open Elective – IV**	OEC	-	-	-	-	3
<b>PRACTICALS</b>								
3	24AD3811	Project Work – Phase-II	EEC	0	0	20	20	10
<b>TOTAL</b>				-	-	-	-	<b>16</b>

**\*If students undergo internship in Semester VII, then the courses offered during semester VII will be offered during semester VIII.**

**\*\*Open Elective IV (Shall be chosen from the list of open electives offered by other Programmes).**

# Elective - Management shall be chosen from the Elective Management courses

TOTAL CREDITS:165

**MANDATORY COURSES I**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24MX3081	Introduction to Women and Gender Studies	MC	3	0	0	3	0
2.	24MX3082	Elements of Literature	MC	3	0	0	3	0
3.	24MX3083	Film Appreciation	MC	3	0	0	3	0
4.	24MX3084	Disaster Risk Reduction and Management	MC	3	0	0	3	0

\*Mandatory Courses are offered as Non-Credit Courses

**MANDATORY COURSES II**

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	24MX3085	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	3	0
2.	24MX3086	History of Science and Technology in India	MC	3	0	0	3	0
3.	24MX3087	Political and Economic Thought for a Humane Society	MC	3	0	0	3	0
4.	24MX3088	State, Nation Building and Politics in India	MC	3	0	0	3	0
5.	24MX3089	Industrial Safety	MC	3	0	0	3	0

\*Mandatory Courses are offered as Non-Credit Courses

**PROFESSIONAL ELECTIVE COURSES: VERTICALS**

Vertical for AIDS I	Vertical II Full Stack Development for IT	Vertical III Cloud Computing and Data Center Technologies	Vertical IV Cyber Security and Data Privacy	Vertical V Creative Media	Vertical VI Emerging Technologies	Vertical for AIDS II
Knowledge Engineering	Cloud Computing	Cloud Computing	Ethical Hacking	Augmented Reality/Virtual Reality	Augmented Reality/Virtual Reality	Bio-Inspired Optimization Techniques

Recommen der Systems	App Development	Virtualization	Digital and Mobile Forensics	Multimedia and Animation	Robotic Process Automation	App Development
Soft Computing	Cloud Services Management	Cloud Services Management	Social Network Security	Video Creation and Editing	Neural Networks and Deep Learning	Health Care Analytics
Text and Speech Analysis	UI and UX Design	Data Warehousing	Modern Cryptography	UI and UX Design	Cyber Security	Cyber Security
Business Analytics	Software Testing and Automation	Storage Technologies	Engineering Secure Software Systems	Digital marketing	Quantum Computing	Optimization Techniques
Image and video analytics	Web Application Security	Software Defined Networks	Cryptocurrency and Blockchain Technologies	Multimedia Data Compression and Storage	Cryptocurrency and Blockchain Technologies	Game Theory
Computer Vision	DevOps	Stream Processing	Network Security	Game Development	Game Development	Cognitive Science
	Principles of Programming Languages	Security and Privacy in Cloud	Security and Privacy in Cloud	Visual Effects	3D Printing and Design	Ethics and AI

### Registration of Professional Elective Courses from Verticals:

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialisation / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals.

Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2021, Clause 4.10 (Amendments).

### **PROFESSIONAL ELECTIVE COURSES: VERTICALS**

#### **VERTICAL 1: VERTICALS FOR AIDS I**

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		

1	24CCS350	Knowledge Engineering	PEC	2	0	2	4	3
2	24CCS360	Recommender Systems	PEC	2	0	2	4	3

3	24CCS364	Soft Computing	PEC	2	0	2	4	3
4	24CCS369	Text and Speech Analysis	PEC	2	0	2	4	3
5	24CCW331	Business Analytics	PEC	2	0	2	4	3
6	24CCS349	Image and Video Analytics	PEC	2	0	2	4	3
7	24CCS338	Computer Vision	PEC	2	0	2	4	3

### VERTICAL 2: FULL STACK DEVELOPMENT FOR IT

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1	24CCS335	Cloud Computing	PEC	2	0	2	4	3
2	24CCS332	App Development	PEC	2	0	2	4	3
3	24CCS336	Cloud Services Management	PEC	2	0	2	4	3
4	24CCS370	UI and UX Design	PEC	2	0	2	4	3
5	24CCS366	Software Testing and Automation	PEC	2	0	2	4	3
6	24CCS374	Web Application Security	PEC	2	0	2	4	3
7	24CCS342	DevOps	PEC	2	0	2	4	3
8	24CCS358	Principles of Programming Languages	PEC	3	0	0	3	3

### VERTICAL 3: CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1	24CCS335	Cloud Computing	PEC	2	0	2	4	3
2	24CCS372	Virtualization	PEC	2	0	2	4	3
3	24CCS336	Cloud Services Management	PEC	2	0	2	4	3
4	24CCS341	Data Warehousing	PEC	2	0	2	4	3
5	24CCS367	Storage Technologies	PEC	3	0	0	3	3
6	24CCS365	Software Defined Networks	PEC	2	0	2	4	3
7	24CCS368	Stream Processing	PEC	2	0	2	4	3
8	24CCS362	Security and Privacy in Cloud	PEC	2	0	2	4	3

### VERTICAL 4: CYBER SECURITY AND DATA PRIVACY

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1	24CCS344	Ethical Hacking	PEC	2	0	2	4	3
2	24CCS343	Digital and Mobile Forensics	PEC	2	0	2	4	3

3	24CCS363	Social Network Security	PEC	2	0	2	4	3
4	24CCS351	Modern Cryptography	PEC	2	0	2	4	3
5	24CB3591	Engineering Secure Software Systems	PEC	2	0	2	4	3
6	24CCS339	Cryptocurrency and Blockchain Technologies	PEC	2	0	2	4	3
7	24CCS354	Network Security	PEC	2	0	2	4	3
8	24CCS362	Security and Privacy in Cloud	PEC	2	0	2	4	3

#### VERTICAL 5: CREATIVE MEDIA

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1	24CCS333	Augmented Reality/Virtual Reality	PEC	2	0	2	4	3
2	24CCS352	Multimedia and Animation	PEC	2	0	2	4	3
3	24CCS371	Video Creation and Editing	PEC	2	0	2	4	3
4	24CCS370	UI and UX Design	PEC	2	0	2	4	3
5	24CCW332	Digital marketing	PEC	2	0	2	4	3
6	24CCS353	Multimedia Data Compression and Storage	PEC	2	0	2	4	3
7	24CCS347	Game Development	PEC	2	0	2	4	3
8	24CCS373	Visual Effects	PEC	2	0	2	4	3

#### VERTICAL 6: EMERGING TECHNOLOGIES

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1	24CCS333	Augmented Reality/Virtual Reality	PEC	2	0	2	4	3
2	24CCS361	Robotic Process Automation	PEC	2	0	2	4	3
3	24CCS355	Neural Networks and Deep Learning	PEC	2	0	2	4	3
4	24CCS340	Cyber Security	PEC	2	0	2	4	3
5	24CCS359	Quantum Computing	PEC	2	0	2	4	3

6	24CCS339	Cryptocurrency and Blockchain Technologies	PEC	2	0	2	4	3
7	24CCS347	Game Development	PEC	2	0	2	4	3
8	24CCS331	3D Printing and Design	PEC	2	0	2	4	3

**VERTICAL 7: VERTICALS FOR AIDS II**

Sl. No.	Course Code	Course Title	Category	Periods Per week			Total Contact period	Credits
				L	T	P		
1	24AD3001	Bio-Inspired Optimization Techniques	PEC	3	0	0	3	3
2	24CCS332	App Development	PEC	2	0	2	4	3
3	24AD3002	Health Care Analytics	PEC	2	0	2	4	3
4	24CCS340	Cyber Security	PEC	2	0	2	4	3
5	24CCS357	Optimization Techniques	PEC	2	0	2	4	3
6	24CCS348	Game Theory	PEC	2	0	2	4	3
7	24CCS337	Cognitive Science	PEC	2	0	2	4	3
8	24CCS345	Ethics and AI	PEC	2	0	2	4	3

### OPEN ELECTIVES

(Students shall choose the open elective courses, such that the course contents are not similar to any other course contents/title under other course categories)

#### OPEN ELECTIVE I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24OAS351	Space Science	OEC	3	0	0	3	3
2	24OIE351	Introduction to Industrial Engineering	OEC	3	0	0	3	3
3	24OBT351	Food, Nutrition and Health	OEC	3	0	0	3	3
4	24OCE351	Environmental and Social Impact Assessment	OEC	3	0	0	3	3
5	24OEE351	Renewable Energy System	OEC	3	0	0	3	3
6	24OEI351	Introduction to Industrial Instrumentation and Control	OEC	3	0	0	3	3
7	24OMA351	Graph Theory	OEC	3	0	0	3	3

#### OPEN ELECTIVE II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24OIE352	Resource Management Techniques	OEC	3	0	0	3	3
2	24OMG351	Fintech Regulation	OEC	3	0	0	3	3
3	24OFD351	Holistic Nutrition	OEC	3	0	0	3	3
4	24AI3021	IT in Agricultural System	OEC	3	0	0	3	3
5	24OEI352	Introduction to Control Engineering	OEC	3	0	0	3	3
6	24OPY351	Pharmaceutical Nanotechnology	OEC	3	0	0	3	3
7	24OAE351	Aviation Management	OEC	3	0	0	3	3

#### OPEN ELECTIVE III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24OHS351	English for Competitive Examinations	OEC	3	0	0	3	3
2	24OMG352	NGOs and Sustainable Development	OEC	3	0	0	3	3

3	24OMG353	Democracy and Good Governance	OEC	3	0	0	3	3
4	24CME365	Renewable Energy Technologies	OEC	3	0	0	3	3
5	24OME354	Applied Design Thinking	OEC	3	0	0	3	3
6	24MF3003	Reverse Engineering	OEC	3	0	0	3	3
7	24OPR351	Sustainable Manufacturing	OEC	3	0	0	3	3
8	24AU3791	Electric and Hybrid Vehicles	OEC	3	0	0	3	3
9	24OAS352	Space Engineering	OEC	3	0	0	3	3
10	24OIM351	Industrial Management	OEC	3	0	0	3	3
11	24OIE354	Quality Engineering	OEC	3	0	0	3	3
12	24OSF351	Fire Safety Engineering	OEC	3	0	0	3	3
13	24OML351	Introduction to Non-destructive Testing	OEC	3	0	0	3	3
14	24OMR351	Mechatronics	OEC	3	0	0	3	3
15	24ORA351	Foundation of Robotics	OEC	3	0	0	3	3
16	24OAE352	Fundamentals of Aeronautical Engineering	OEC	3	0	0	3	3
17	24OGI351	Remote Sensing Concepts	OEC	3	0	0	3	3
18	24OAI351	Urban Agriculture	OEC	3	0	0	3	3
19	24OEN351	Drinking Water Supply and Treatment	OEC	3	0	0	3	3
20	24OEE352	Electric Vehicle Technology	OEC	3	0	0	3	3
21	24OEI353	Introduction to PLC Programming	OEC	3	0	0	3	3
22	24OCH351	Nano Technology	OEC	3	0	0	3	3
23	24OCH352	Functional Materials	OEC	3	0	0	3	3

24	24OFD352	Traditional Indian Foods	OEC	3	0	0	3	3
25	24OFD353	Introduction to food processing	OEC	3	0	0	3	3
26	24OPY352	IPR for Pharma Industry	OEC	3	0	0	3	3
27	24OTT351	Basics of Textile Finishing	OEC	3	0	0	3	3
28	24OTT352	Industrial Engineering for Garment Industry	OEC	3	0	0	3	3
29	24OTT353	Basics of Textile Manufacture	OEC	3	0	0	3	3
30	24OPE351	Introduction to Petroleum Refining and Petrochemicals	OEC	3	0	0	3	3
31	24CPE334	Energy Conservation and Management	OEC	3	0	0	3	3
32	24OPT351	Basics of Plastics Processing	OEC	3	0	0	3	3

33	24OEC351	Signals and Systems	OEC	3	0	0	3	3
34	24OEC352	Fundamentals of Electronic Devices and Circuits	OEC	3	0	0	3	3
35	24CBM348	Foundation Skills in Integrated Product Development	OEC	3	0	0	3	3
36	24CBM333	Assistive Technology	OEC	3	0	0	3	3
37	24OMA352	Operations Research	OEC	3	0	0	3	3
38	24OMA353	Algebra and Number Theory	OEC	3	0	0	3	3
39	24OMA354	Linear Algebra	OEC	3	0	0	3	3
40	24OCE353	Lean Concepts, Tools and Practices	OEC	3	0	0	3	3
41	24OBT352	Basics of Microbial Technology	OEC	3	0	0	3	3
42	24OBT353	Basics of Biomolecules	OEC	3	0	0	3	3
43	24OBT354	Fundamentals of Cell and Molecular Biology	OEC	3	0	0	3	3

*Position your profession*

#### OPEN ELECTIVE IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24OHS352	Project Report Writing	OEC	3	0	0	3	3
2	24OMA355	Advanced Numerical Methods	OEC	3	0	0	3	3
3	24OMA356	Random Processes	OEC	3	0	0	3	3
4	24OMA357	Queuing and Reliability Modelling	OEC	3	0	0	3	3
5	24OMG354	Production and Operations Management for Entrepreneurs	OEC	3	0	0	3	3

6	24OMG355	Multivariate Data Analysis	OEC	3	0	0	3	3
7	24OME352	Additive Manufacturing	OEC	3	0	0	3	3
8	24CME343	New Product Development	OEC	3	0	0	3	3
9	24OME355	Industrial Design & Rapid Prototyping Techniques	OEC	3	0	0	3	3
10	24MF3010	Micro and Precision Engineering	OEC	3	0	0	3	3
11	24OMF354	Cost Management of Engineering Projects	OEC	3	0	0	3	3
12	24AU3002	Batteries and Management system	OEC	3	0	0	3	3
13	24AU3008	Sensors and Actuators	OEC	3	0	0	3	3

14	24OAS353	Space Vehicles	OEC	3	0	0	3	3
15	24OIM352	Management Science	OEC	3	0	0	3	3
16	24OIM353	Production Planning and Control	OEC	3	0	0	3	3
17	24OIE353	Operations Management	OEC	3	0	0	3	3
18	24OSF352	Industrial Hygiene	OEC	3	0	0	3	3
19	24OSF353	Chemical Process Safety	OEC	3	0	0	3	3
20	24OML352	Electrical, Electronic and Magnetic materials	OEC	3	0	0	3	3
21	24OML353	Nanomaterials and Applications	OEC	3	0	0	3	3
22	24OMR352	Hydraulics and Pneumatics	OEC	3	0	0	3	3
23	24OMR353	Sensors	OEC	3	0	0	3	3
24	24ORA352	Concepts in Mobile Robots	OEC	3	0	0	3	3
25	24MV3501	Marine Propulsion	OEC	3	0	0	3	3
26	24OMV351	Marine Merchant Vessels	OEC	3	0	0	3	3
27	24OMV352	Elements of Marine Engineering	OEC	3	0	0	3	3
28	24CRA332	Drone Technologies	OEC	3	0	0	3	3
29	24OGI352	Geographical Information System	OEC	3	0	0	3	3
30	24OAI352	Agriculture Entrepreneurship Development	OEC	3	0	0	3	3
31	24OEN352	Biodiversity Conservation	OEC	3	0	0	3	3
32	24OEE353	Introduction to control systems	OEC	3	0	0	3	3
33	24OEI354	Introduction to Industrial Automation Systems	OEC	3	0	0	3	3
34	24OCH353	Energy Technology	OEC	3	0	0	3	3
35	24OCH354	Surface Science	OEC	3	0	0	3	3
36	24OFD354	Fundamentals of Food Engineering	OEC	3	0	0	3	3

37	24OFD355	Food safety and Quality Regulations	OEC	3	0	0	3	3
38	24OPY353	Nutraceuticals	OEC	3	0	0	3	3
39	24OTT354	Basics of Dyeing and Printing	OEC	3	0	0	3	3
40	24FT3201	Fibre Science	OEC	3	0	0	3	3
41	24OTT355	Garment Manufacturing Technology	OEC	3	0	0	3	3
42	24OPE353	Industrial safety	OEC	3	0	0	3	3
43	24OPE354	Unit Operations in Petro Chemical Industries	OEC	3	0	0	3	3
44	24OPT352	Plastic Materials for Engineers	OEC	3	0	0	3	3

45	24OPT353	Properties and Testing of Plastics	OEC	3	0	0	3	3
46	24OEC353	VLSI Design	OEC	3	0	0	3	3
47	24CBM370	Wearable Devices	OEC	3	0	0	3	3
48	24CBM356	Medical Informatics	OEC	3	0	0	3	3
49	24OCE354	Basics of Integrated Water Resources Management	OEC	3	0	0	3	3
50	24OBT355	Biotechnology for Waste Management	OEC	3	0	0	3	3
51	24OBT356	Lifestyle Diseases	OEC	3	0	0	3	3
52	24OBT357	Biotechnology in Health Care	OEC	3	0	0	3	3

<b>B.Tech Artificial Intelligence and Data Science</b>										
S.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII/VIII	VIII/VII	
1	HSMC	3	3					2	3	11
2	BSC	8	8	4	6					26
3	ESC	9	10	4						23
4	PCC			17	17	14	8			56
5	PEC					6	9	3		18
6	OEC						3	6	3	12
7	EEC	2	1	1		2	1	2	10	19
8	Non-Credit / (Mandatory)	√				√	√			√
<b>Total</b>		<b>22</b>	<b>22</b>	<b>26</b>	<b>23</b>	<b>22</b>	<b>21</b>	<b>13</b>	<b>16</b>	<b>165</b>

## **ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)**

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes, Moreover, for minor degree the student can register for courses from any one of the following verticals also.

Complete details are available in clause 4.10 (Amendments) of Regulations 2021.

### **VERTICALS FOR MINOR DEGREE (In addition to all the verticals of other programmes)**

<b>Vertical I</b>	<b>Vertical II</b>	<b>Vertical III</b>	<b>Vertical IV</b>	<b>Vertical V</b>
<b>Fintech and Block Chain</b>	<b>Entrepreneurship</b>	<b>Public Administration</b>	<b>Business Data Analytics</b>	<b>Environment and Sustainability</b>
Financial Management	Foundations of Entrepreneurship	Principles of Public Administration	Statistics for Management	Sustainable infrastructure Development
Fundamentals of Investment	Team Building and Leadership Management for Business	Constitution of India	Datamining for Business Intelligence	Sustainable Agriculture and Environmental Management
Banking, Financial Services and Insurance	Creativity and Innovation in Entrepreneurship	Public Personnel Administration	Human Resource Analytics	Sustainable Bio Materials
Introduction to Blockchain and its Applications	Principles of Marketing Management for Business	Administrative Theories	Marketing and Social Media Web Analytics	Materials for Energy Sustainability
Fintech Personal Finance and Payments	Human Resource Management for Entrepreneurs	Indian Administrative System	Operation and Supply Chain Analytics	Green Technology
Introduction to Fintech	Financing New Business Ventures	Public Policy Administration	Financial Analytics	Environmental Quality Monitoring and Analysis
-	-	-	-	Integrated Energy Planning for Sustainable Development
-	-	-	-	Energy Efficiency for Sustainable Development

(Choice of courses for Minor degree is to be made from any one vertical of other programmes or from anyone of the following verticals)

**VERTICAL 1: FINTECH AND BLOCK CHAIN**

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG331	Financial Management	PEC	3	0	0	3	3
2.	CMG332	Fundamentals of Investment	PEC	3	0	0	3	3
3.	CMG333	Banking, Financial Services and Insurance	PEC	3	0	0	3	3
4.	CMG334	Introduction to Blockchain and its Applications	PEC	3	0	0	3	3
5.	CMG335	Fintech Personal Finance and Payments	PEC	3	0	0	3	3
6.	CMG336	Introduction to Fintech	PEC	3	0	0	3	3

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG337	Foundations of Entrepreneurship	PEC	3	0	0	3	3
2.	CMG338	Team Building and Leadership Management for Business	PEC	3	0	0	3	3
3.	CMG339	Creativity and Innovation in Entrepreneurship	PEC	3	0	0	3	3
4.	CMG340	Principles of Marketing Management for Business	PEC	3	0	0	3	3
5.	CMG341	Human Resource Management for Entrepreneurs	PEC	3	0	0	3	3
6.	CMG342	Financing New Business Ventures	PEC	3	0	0	3	3

**VERTICAL 2: ENTREPRENERUSHIP**

**VERTICAL 3: PUBLIC ADMINISTRATION**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG343	Principles of Public Administration	PEC	3	0	0	3	3
2.	CMG344	Constitution of India	PEC	3	0	0	3	3

3.	CMG345	Public Personnel Administration	PEC	3	0	0	3	3
4.	CMG346	Administrative Theories	PEC	3	0	0	3	3
5.	CMG347	Indian Administrative System	PEC	3	0	0	3	3
6.	CMG348	Public Policy Administration	PEC	3	0	0	3	3

#### VERTICAL 4: BUSINESS DATA ANALYTICS

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CMG349	Statistics for Management	PEC	3	0	0	3	3
2.	CMG350	Datamining for Business Intelligence	PEC	3	0	0	3	3
3.	CMG351	Human Resource Analytics	PEC	3	0	0	3	3
4.	CMG352	Marketing and Social Media Web Analytics	PEC	3	0	0	3	3
5.	CMG353	Operation and Supply Chain Analytics	PEC	3	0	0	3	3
6.	CMG354	Financial Analytics	PEC	3	0	0	3	3

#### VERTICAL 5: ENVIRONMENT AND SUSTAINABILITY

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	CES331	Sustainable infrastructure Development	PEC	3	0	0	3	3
2.	CES332	Sustainable Agriculture and Environmental Management	PEC	3	0	0	3	3
3.	CES333	Sustainable Bio Materials	PEC	3	0	0	3	3
4.	CES334	Materials for Energy Sustainability	PEC	3	0	0	3	3
5.	CES335	Green Technology	PEC	3	0	0	3	3
6.	CES336	Environmental Quality Monitoring and Analysis	PEC	3	0	0	3	3
7.	CES337	Integrated Energy Planning for Sustainable Development	PEC	3	0	0	3	3
8.	CES338	Energy Efficiency for Sustainable Development	PEC	3	0	0	3	3



24HS3151

FUNCTIONAL ENGLISH

L	T	P	C
2	0	0	2

**COURSE OBJECTIVES:**

1. To develop engineering and technology students basic reading and writing skills.
2. To help learners develop their listening skills, enable them to listen to lectures and comprehend them by asking questions; and seeking clarifications.
3. To help learners develop their speaking skills and speak fluently in real contexts.
4. To help learners develop vocabulary of a general kind by developing their reading skills

**UNIT I BASIC ENGLISH FOR EFFECTIVE COMMUNICATION 6**

Listening: Listening to short extracts-British Council B1 & B2 speaking: Self Introduction, introducing others, Extempore, Impromptu, Reading: Reading short stories, comprehension - skimming-scanning Writing: Developing hints, Free writing Language development: Present Tense, Articles, Modal Verbs Vocabulary development: - Word formation -Prefixes & Suffixes, root words.

**UNIT - II CONTEXTUAL COMMUNICATION SKILLS 6**

Listening: Telephonic conversations, conceptual conversations, Listening to experience speaking: Sharing information of a personal kind, greeting, taking leave, Manuscript, Memorized Reading: Reading newspapers and understanding the context Writing: Paragraph writing -Day-to-day events, Cloze exercises Language development: Past Tense, Subject-verb Agreement Vocabulary development: Guessing meanings of words in context.

**UNIT - III DISCOURSE AND STRUCTURE 6**

Listening: Listening to product descriptions; and narratives from different sources-speaking: Short presentation, asking about routine actions and expressing facts and opinions, Reading: Interpreting pictures of visual graphics- Reading and reviewing Books/Articles Writing: Understanding text structure, jumbled sentences -Language development: Future Tense, Degrees of comparison, Gerunds and Infinitives -Vocabulary development: use of reference words and discourse markers, Idioms and Phrases

**UNIT - IV INTERACTIVE AND WRITTEN COMMUNICATION 6**

Listening- Listening to dialogues - listening to longer texts and filling up the blanks, speaking-Role Play, Travelogue -Reading: Reading different types of magazines Writing: Formal and Informal letter writing, E-mail etiquette Language development: Wh questions- Question Tags Vocabulary development: synonyms-antonyms, phrasal verbs, If Conditional Clause

**UNIT - V ACADEMIC FLUENCY AND STRUCTURED EXPRESSION 6**

Listening: Listening to a podcas speaking: conversational speaking, short group conversations, Reading: Journals both general and technical Writing: Writing short essays, hints development, dialogue writing Language development: Spelling and Punctuations, Cause and Effect, Transition words, Vocabulary development-collocations, Use of sequence words .

**TOTAL: 30 PERIODS**

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

- CO1** Write effectively and flawlessly avoiding grammatical errors in a variety of professional and social settings.
- CO2** Utilize appropriate writing strategies in technical and business context.
- CO3** Make use of listening skills in business and workplace environments and relates to oral communication confidently.
- CO4** Develop corporate test-taking strategies as well as employability skills.
- CO5** Exhibits learners' reading skills for effective communication in personal and official conversations / situations .

**TEXT BOOKS:**

1. Board of Editors. Fluency in English A course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016.
2. Rizvi, Ashraf. M. Effective Technical Communication, Tata McGraw-Hill, New Delhi, 2017

**REFERENCES:**

1. Raman, Meenakshi and Sharma, Sangeetha "Technical Communication Principles and Practice" Oxford University Press: New Delhi, 2014
2. Kumar, Suresh. E. "Engineering English" Orient Blackswan: Hyderabad, 2015.
3. Muralikrishna, & Sunita Mishra. Communication Skills for Engineers. Pearson, New Delhi. 2011.
4. Mitra K. Barun, "Effective Technical Communication – A Guide for Scientists and Engineers", Oxford University Press, New Delhi, 2006.

**CO's-PO's & PSO's MAPPING:**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	1	1	1	1	1	3	3	1	3		3		
2	1	1	1	1	1	3	3	1	3		3		
3	2	3	2	3	2	3	3	2	3	3	3		
4	2	3	2	3	2	3	3	2	3	3	3		
5	2	3	3	3		3	3	2	3		3		

**Low (1) ; Medium (2) ; High (3)**

*D. Indumathi*

Course Coordinator

(D. Indumathi)  
AP/Eng.

*(Signature)*

BoS Chairman / HoD (S&H)



24MA3151

MATRICES AND CALCULUS

L	T	P	C
3	1	0	4

**COURSE OBJECTIVES:**

1. To develop the use of matrix algebra techniques that is needed by engineers for practical application
2. To familiarize the students with concepts of differential calculus.
3. To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
4. To familiarize the student with functions of several variables.
5. To make the students understand various techniques of integration.

**UNIT I MATRICES**

9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

**UNIT – II DIFFERENTIAL CALCULUS**

9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

**UNIT – III DIFFERENTIAL EQUATIONS**

9+3

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

**UNIT – IV FUNCTIONS OF SEVERAL VARIABLES**

9+3

Limits and Continuity – Partial derivatives – Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor’s series for functions of two variables – Maxima and minima of functions of two variables – Lagrange’s method of undetermined multipliers

**UNIT – V INTEGRAL CALCULUS**

9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric substitutions, Double integrals – Area enclosed by plane curves.

**TOTAL: 45+15 PERIODS**

**COURSE OUTCOMES:**

**At the end of the course the students will be able to**

- CO1 Use the matrix algebra methods for solving practical problems.
- CO2 Use both the limit definition and rules of differentiation to differentiate functions
- CO3 Explain the concept of differential equation.
- CO4 Use differential calculus ideas on several variable functions.
- CO5 Evaluate integrals both by using Riemann sums and by using the fundamental theorem of calculus.



# SRI RANGANATHAR

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(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai)  
Athipalayam, Coimbatore - 641 110. website: sriet.ac.in, Ph: 0422 - 2697792

**TEXT BOOKS:**

1. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd., 2011.
2. Grewal. B.S, "Higher Engineering Mathematics", 41<sup>st</sup> Edition, Khanna Publications, Delhi, 2011.
3. Kreyszig Erwin, "Advanced Engineering Mathematics", John Wiley and Sons, 10<sup>th</sup> Edition, New Delhi, 2016

**REFERENCES:**

1. Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd., 2011.
2. Glyn James, "Advanced Modern Engineering Mathematics", 3<sup>rd</sup> Edition, Pearson Education, 2012
3. Peter V. O'Neil," Advanced Engineering Mathematics", 7<sup>th</sup> Edition, Cengage learning, 2012.
4. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008.
5. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, PEARSON Publishing, 2011.

**CO's-PO's & PSO's MAPPING**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	3	1	1				2		2	3		
2	3	3	1	1				2		2	3		
3	3	3	1	1				2		2	3		
4	3	3	1	1				2		2	3		
5	3	3	1	1				2		2	3		

**Low (1) ; Medium (2) ; High (3)**

*(Signature)*  
Course Coordinator

*(Signature)*  
BOS Chairman/ HoD(S&H)



24GE3052

**PROBLEM SOLVING AND PYTHON  
 PROGRAMMING**

**L T P C**  
**3 0 0 3**

**COURSE OBJECTIVES:**

1. To understand the basics of algorithmic problem solving.
2. To learn to solve problems using Python conditionals and loops.
3. To define Python functions and use function calls to solve problems.
4. To use Python data structures - lists, tuples, dictionaries to represent complex data.
5. To do input/output with files in Python.

**UNIT I COMPUTATIONAL THINKING AND PROBLEM SOLVING 9**

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), simple strategies for developing algorithms (iteration, recursion) tower of Hanoi.

**UNIT – II DATATYPE, EXPRESSIONS, CONDITIONS 9**

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string and list; variables, expressions, statements, precedence of operators, comments, Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else)

**UNIT – III CONTROL FLOW, FUNCTIONS, STRINGS 9**

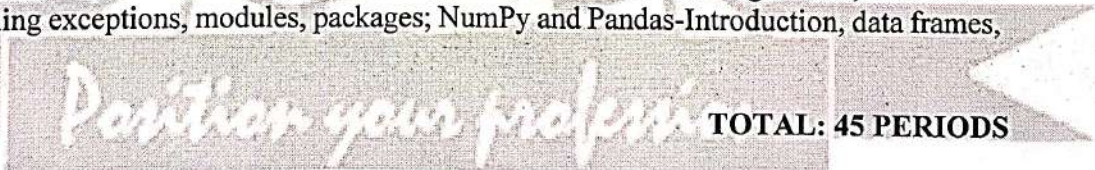
Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module.

**UNIT – IV LISTS, TUPLES, DICTIONARIES 9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: operations and methods, tuple assignment, Dictionaries: operations and methods; advanced list processing.

**UNIT – V FILES, MODULES, PACKAGES AND LIBRARIES 9**

Files and exceptions: text files, reading and writing files, command line arguments, errors and exceptions, handling exceptions, modules, packages; NumPy and Pandas-Introduction, data frames, data handling.





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### COURSE OUTCOMES:

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

- CO1 Develop algorithmic solutions to simple computational problems.
- CO2 Develop and execute simple Python programs using condition.
- CO3 Decompose a Python program into functions and execute simple program using functions.
- CO4 Represent compound data using Python lists, tuples, dictionaries etc.
- CO5 Read and write data from/to files in Python programs.

### TEXT BOOKS:

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

### REFERENCES:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John VGutttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.

### CO's-PO's & PSO's MAPPING

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

Low (1) ; Medium (2) ; High (3)

*G. Suley*  
COURSE COORDINATOR

*Len 7a.7*  
BOS CHAIRMAN / HOD



# SRI RANGANATHAR

## INSTITUTE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution)



(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai)  
Athipalayam, Coimbatore - 641 110. website: sriet.ac.in, Ph: 0422 - 2697792

24GE3051

ENGINEERING GRAPHICS

L	T	P	C
2	2	0	4

### COURSE OBJECTIVES:

1. Drawing engineering curves
2. Drawing of projection of lines and plane surfaces
3. Drawing projection of solids.
4. Drawing section of solids and development of solids
5. Drawing isometric and freehand sketch of simple objects.

### UNIT I PLANE CURVES

12

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves.

### UNIT – II PROJECTION OF LINES AND PLANE SURFACE

12

Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

### UNIT – III PROJECTION OF SOLIDS

10

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

### UNIT – IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES

12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones

### UNIT – V ISOMETRIC AND FREE HAND SKETCHING

14

Principles of isometric projection — isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.

**TOTAL: 60 PERIODS**

### COURSE OUTCOMES:

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

- CO1** Draw basic geometrical constructions and draw various engineering curves such as conics (ellipse, parabola, hyperbola), cycloids, and involutes, including constructing tangents and normal to these curves.
- CO2** Apply principles of orthographic projection to lines and plane surfaces in first angle projection, and determine true lengths and inclinations of lines and planes using the rotating line and rotating object methods.
- CO3** Project simple solids with inclined axes using rotating object method.
- CO4** Demonstrate proficiency in sectioning solids with inclined cutting planes and developing lateral surfaces of various solids, and also obtaining true shapes of sections and surface developments.
- CO5** Draw isometric projections of simple and truncated solids using isometric scales and apply visualization principles to represent 3D objects accurately through freehand techniques.

**TEXT BOOKS:**

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

**REFERENCES:**

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2<sup>nd</sup> Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27<sup>th</sup> Edition, 2017.
3. Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

**CO's-PO's & PSO's MAPPING**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	2	2	1	1						2	1	3
2	3	3	2	1	1						2	1	3
3	3	2	2	1	1						2	1	3
4	3	3	2	1	1						2	1	3
5	3	2	3	1	1						2	2	3
Low (1) ; Medium (2) ; High (3)													

*M. Chauhan*  
Course Coordinator

*Seeta*  
BoS Chairman/HoD



24GE3152

தமிழர் மரபு

L T P C  
1 0 0 1

**COURSE OBJECTIVES:**

1. இந்திய மொழிக் குடும்பங்கள் பற்றிய அறிவை வழங்குதல், திராவிட மொழிகள் மற்றும் தமிழ் ஒரு செம்மொழியாக நிலை பெறுதல்.
2. பாறை ஓவியங்கள் முதல் நவீன சிற்பங்கள் வரை தமிழ் கலையை ஆய்வு செய்தல், அதன் வரலாற்று மற்றும் கலாச்சார சூழலைப் புரிந்துகொள்வது.
3. நாட்டுப்புறக் கலைகளை ஆராய்தல், தமிழ் கலாச்சாரம் மற்றும் சமூகத்தில் அவற்றின் பங்கைப் புரிந்துகொள்வது.
4. தமிழ் கல்வெட்டுகளின் வரலாறு மற்றும் பரிணாம வளர்ச்சியைப் புரிந்து கொள்ளுதல்
5. இந்திய சுதந்திரப் போராட்டத்தில் தமிழர்களின் பங்கை பகுப்பாய்வு செய்தல்.

**அலகு I**

**மொழி மற்றும் இலக்கியம்**

3

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியங்களில் அகவாழ்வு மற்றும் புறவாழ்வு - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

**அலகு - II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை**

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - சுடுமண் சிற்பங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை

**அலகு- III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**

3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம் - இசைக் கருவிகள் மிருதங்கம், பறை, வீணை, யாழ், தமிழர்களின் விளையாட்டுகள்.

**அலகு - IV கல்வெட்டு மற்றும் தொல்லியல்**

3

கல்வெட்டின் வரலாறு உத்தரமேரூர் கல்வெட்டு - தேர்தல் முறைகள் - தஞ்சாவூர் பெருவுடையார் கோயில் கல்வெட்டு - தொல்லியல் என்றால் என்ன? அதன் பணி - தமிழர் நகரங்கள் ; பூம்புகார், கீழடி, அரிக்காமேடு, ஆதிச்சநல்லூர்

**அலகு - V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**

3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - சமூக நீதி மற்றும் சமத்துவ இயக்கங்கள் -சுயமரியாதை இயக்கம்- பெண்கள் உரிமை மற்றும் சமூக எழுச்சி இயக்கம் - சமூக நீதிக்கான சட்டங்கள் - இடஒதுக்கீடு மற்றும் கல்வி வாய்ப்பு

**TOTAL: 15 PERIODS**



24GE3152

HERITAGE OF TAMIL

L T P C  
1 0 0 1

**COURSE OBJECTIVES:**

1. To provide the knowledge on the Indian language families, focusing on Dravidian languages and the status of Tamil as a classical language.
2. To study the Tamil art from ancient rock paintings to modern sculptures, understanding its historical and cultural context
3. To explore folk arts like Therukuthu, Karagattam, Villupattu, and Silambattam, understanding their role in Tamil culture and society
4. To understand the history and evolution of Tamil inscriptions, from the Brahmi script to the Tamil Vatteluthu script
5. To analyze the role of Tamils in the Indian Freedom Struggle, highlighting their significant contributions.

**UNIT I LANGUAGE AND LITERATURE**

3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil— Inner life and outer life in Sangam literature- Management Principles in Thirukural - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

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

3

Hero stone to modern sculpture - Bronze statues - Tribals and their handicrafts, toys - Clay sculptures - Thiruvalluvar statue at Kumarimunai

**UNIT – III FOLK AND MARTIAL ARTS**

3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram Sports and Games of Tamils.

**UNIT – IV INSCRIPTION AND ARCHAEOGY**

3

History of Inscription Uttaramerur Inscription – Election Methods - Thanjavur Peruvudaiyar Temple Inscription – What is Archaeology? Its Work - Tamil Cities; Poompuhar, Keezhadi, Arikamedu,

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

3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - - Women's Rights and Social Uprising Movement - Laws for Social Justice - Reservation and Educational Opportunity.

**TOTAL: 15 PERIODS**



# SRI RANGANATHAR INSTITUTE OF ENGINEERING AND TECHNOLOGY (An Autonomous Institution)



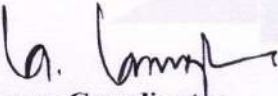
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
## பாடநூல் / TEXT BOOKS:

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

## பார்வை நூல் : REFERENCES:

1. The Contributions of the Tamils to Indian Culture (Dr. M. Valarmathi) (Published by: International Institute of Tamil Studies.)
2. Keeladi - 'Sangam City Civilization on the banks of river Vaigai (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
3. Tamil Nadu) Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
4. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
5. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by: RMRL) - Reference Book.

  
Course Coordinator

  
BoS Chairman / HoD (S&H)



24CY3051

ENGINEERING CHEMISTRY

L	T	P	C
3	0	2	4

**COURSE OBJECTIVES:**

1. To inculcate sound understanding of water quality parameters and sample analysis methodologies.
2. To impart knowledge on the basic principles and preparatory methods of nanomaterials.
3. To introduce the basic concepts and applications of phase rule and alloys.
4. To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.
5. To make students understand the fundamentals of polymer chemistry.

**UNIT I WATER TREATMENT & ANALYSIS**

9

Water: Sources and impurities, Water quality parameters, Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & Foaming. Desalination of brackish water: Reverse Osmosis Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization.

**UNIT – II NANOCHEMISTRY**

9

Basics: Distinction between molecules, nanomaterials and bulk materials. Types of nanomaterials: definition, properties and uses of nanorods, nanowire and nanotube. Properties of nanomaterials (optical, electrical, mechanical and magnetic). Preparation of nanomaterials: Laser ablation, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

**UNIT – III PHASE RULE AND ALLOYS**

9

Phase rule: Introduction, Terms. One component system – water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Two component system: lead-silver system, Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel.

**UNIT – IV ENERGY SOURCES AND STORAGE DEVICES**

9

Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion - Recent developments in solar cell materials. Geothermal energy; Batteries: Types of batteries, Primary battery – dry cell, Secondary battery – lead acid battery and lithium-ion battery; Electric vehicles – working principles; Fuel cells: H<sub>2</sub>-O<sub>2</sub> fuel cell.

**UNIT – V POLYMER CHEMISTRY**

9

Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types and mechanism of polymerization: Addition (Free Radical, cationic and anionic); condensation and copolymerization. Preparation, properties and uses of Nylon 6,6, and Epoxy resin.

**TOTAL: 45 PERIODS**



### LIST OF EXPERIMENTS

1. Preparation of  $\text{Na}_2\text{CO}_3$  as a primary standard and estimation of acidity of a water sample using the primary standard.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of chloride content of water sample by Argentometric method.
4. Determination of strength of given hydrochloric acid using pH meter.
5. Synthesis of ZnO nanoparticles.

**TOTAL : 30 PERIODS**

**TOTAL : 45+30 = 75 PERIODS**

### COURSE OUTCOMES:

**At the end of the course the students will be able to**

- CO1** To give proper water treatment methods for analysing the acid, hardness, chloride and the pH metry methodology.
- CO2** To recognize and use fundamental ideas in nanoscience and nanotechnology when planning the synthesis of nanomaterials for engineering and technological use.
- CO3** To utilize the phase rule and alloys expertise to work for the needs of material selection.
- CO4** To identify various energy resource types and use them for proper uses in the energy sector.
- CO5** To educate students the fundamentals of polymer chemistry.

### TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17<sup>th</sup> Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12<sup>th</sup> Edition, 2018.
4. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2<sup>nd</sup> Edition, 2017.

### REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. T. Pradeep, "Nano: The Essentials: Understanding Nano science and Nano technology", (2008) Tata McGraw-Hill Publishing Company Limited, New Delhi.
3. B.R.Puri, L.R.Sharma, M.S.Pathania, "Principles of Physical Chemistry", Vishal Publishing Company, 2008.
4. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2<sup>nd</sup> Edition, 2013.



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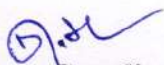



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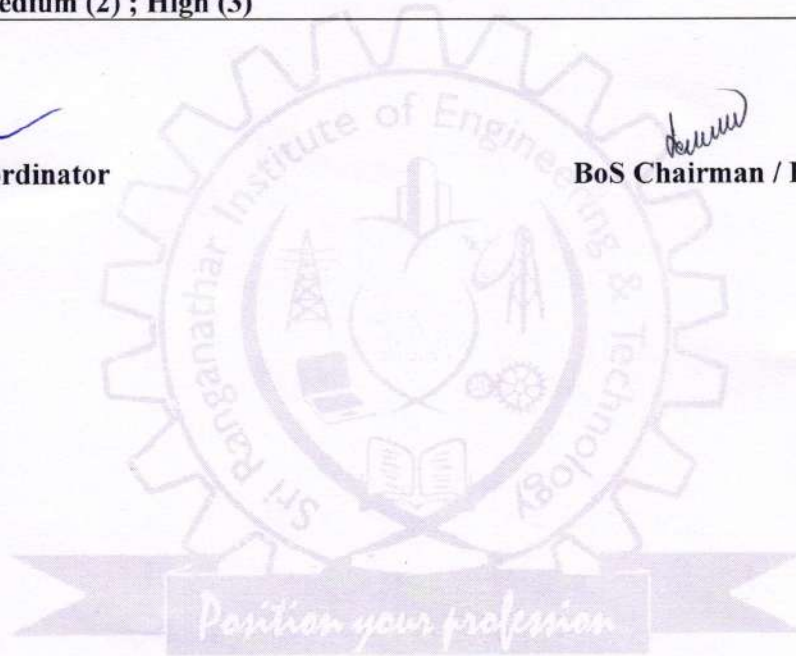
### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	2	2	2		1		2			1		
2	2	1	1	1		2		1			1		
3	3	1	1	1		1		1			1		
4	3	1	1	1		2		1			1		
5	3	1	2	1		2		2			2		

Low (1) ; Medium (2) ; High (3)

  
Course Coordinator

  
BoS Chairman / HoD (S&H)





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24GE3072

### PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY

L	T	P	C
0	0	4	2

#### COURSE OBJECTIVES:

1. To understand the problem solving approaches.
2. To learn the basic programming constructs in Python.
3. To practice various computing strategies for Python-based solutions to real world problems.
4. To use Python data structures - lists, tuples, dictionaries.
5. To do input/output with files in Python.

#### LIST OF EXPERIMENTS:

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, compute Electrical Current in Three Phase AC Circuit, etc.)
2. Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
3. Scientific problems using Conditionals and Iterative loops. (Number series, Number Patterns, pyramid pattern)
4. Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building – operations of list & tuples).
5. Implementing real-time/technical applications using Sets, Dictionaries. (Language, components of an automobile, Elements of a civil structure, etc.- operations of Sets & Dictionaries)
6. Implementing programs using Functions. (Factorial, largest number in a list, area of shape)
7. Implementing programs using Strings. (reverse, palindrome, character count)
8. Implementing programs using written modules and Python Standard Libraries pandas, numpy. Matplotlib)
9. Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
10. Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation).

*Partition your profession*

**TOTAL:60 PERIODS**

#### COURSE OUTCOMES:

**At the end of the course the students will be able to**

- CO1 Develop algorithmic solutions to simple computational problems.
- CO2 Develop and execute simple Python programs
- CO3 Implement programs in Python using conditionals and loops for solving problems.
- CO4 Deploy functions to decompose a Python program
- CO5 Process compound data using Python data structures.



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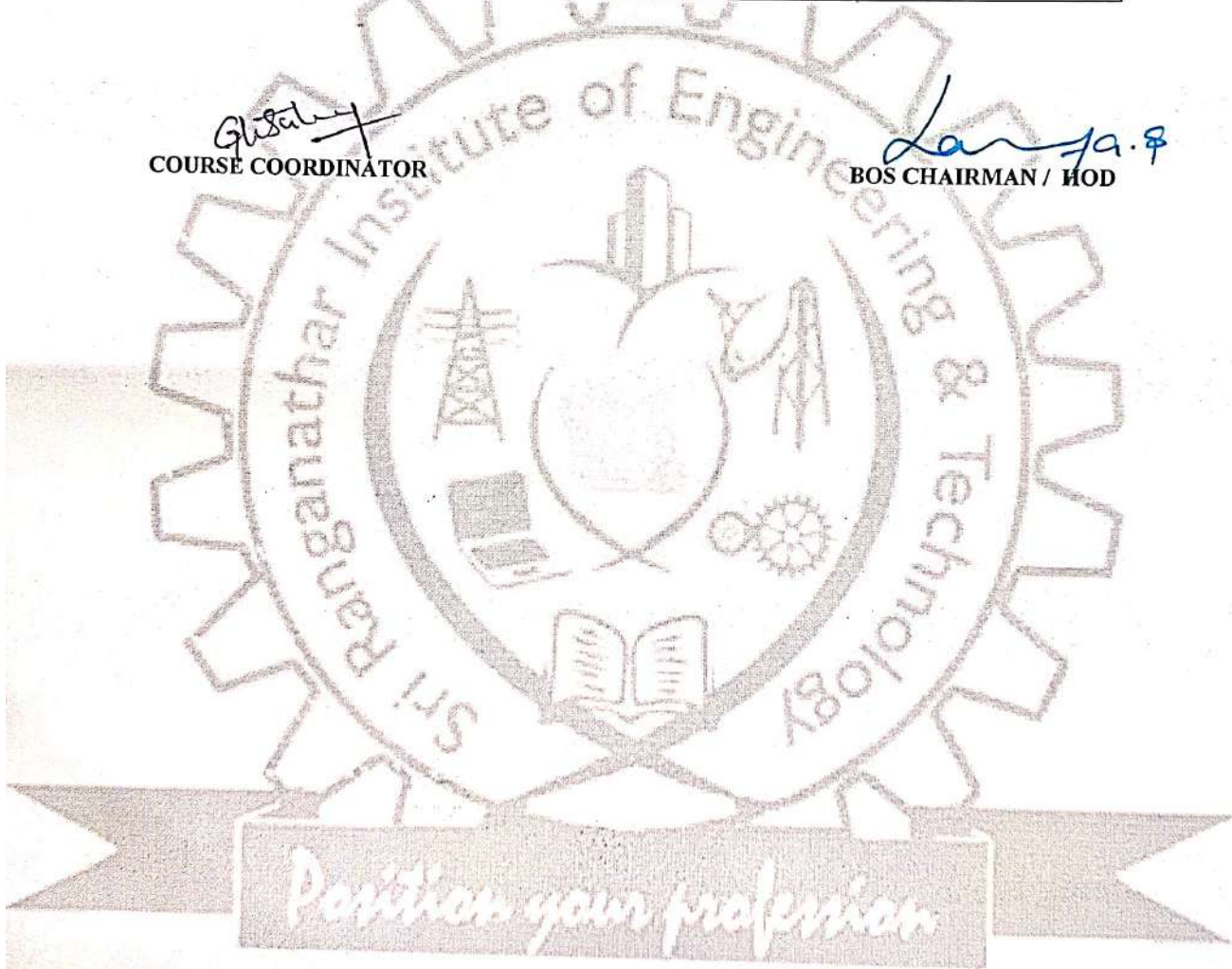
### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	3	3	3	2					2	2	3	3
2	3	3	3	3	2					2	2	3	
3	3	3	3	3	2					2		3	
4	2	2		2	2					1		3	
5	1	2			1					1		2	

Low (1) ; Medium (2) ; High (3)

*Ghata*  
 COURSE COORDINATOR

*Lanja. S*  
 BOS CHAIRMAN / HOD





# SRI RANGANATHAR

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24ES3151

BASIC COMPUTING SKILLS FOR ENGINEERS

L T P C

0 0 2 1

### COURSE OBJECTIVES:

1. Create and edit documents, spreadsheets, and presentations using MS Office.
2. Use advanced features like mail merge, data forms, and subtotalling in MS Excel
3. Design professional slides and presentations using MS PowerPoint.
4. Apply data analysis and visualization techniques using charts and graphs.
5. Use internet resources effectively and safely.

#### UNIT -I MS OFFICE

7

Creating, editing, saving and printing text documents - Font and paragraph formatting - Simple character formatting - Inserting tables, smart art, page breaks - Using lists and styles - Working with images - Using Spelling and Grammar check - Understanding document properties - Mail Merge.

#### UNIT - II MS EXCEL

7

Spreadsheet basics - Creating, editing, saving and printing spreadsheets - Working with functions & formulas - Modifying worksheets with color & autoformats - Graphically representing data : Charts & Graphs - Speeding data entry : Using Data Forms - Analyzing data : Data Menu, Subtotal, Filtering Data- Formatting worksheets - Securing & Protecting spreadsheets.

#### UNIT - III MS POWER POINT

8

Opening, viewing, creating, and printing slides - Applying auto layouts Adding custom animation - Using slide transitions - Graphically representing data : Charts & Graphs - Creating Professional Slide for Presentation.

#### UNIT -IV INTERNET

8

Understanding how to search/Google - bookmarking and Going to a specific website - Copy and paste Internet content into your word file and emails - Understanding social media platforms such as Facebook & Many more - learn with best practices.

**TOTAL: 30 PERIODS**

### COURSE OUTCOMES

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

- CO1 To create, edit, and format professional documents using MS Word.
- CO2 To design, create, and manage spreadsheets using MS Excel for data analysis.
- CO3 To create engaging presentations using MS PowerPoint with multimedia elements.
- CO4 To effectively use internet resources, apply online safety practices, and leverage social media.



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### CO's-PO's & PSO's MAPPING

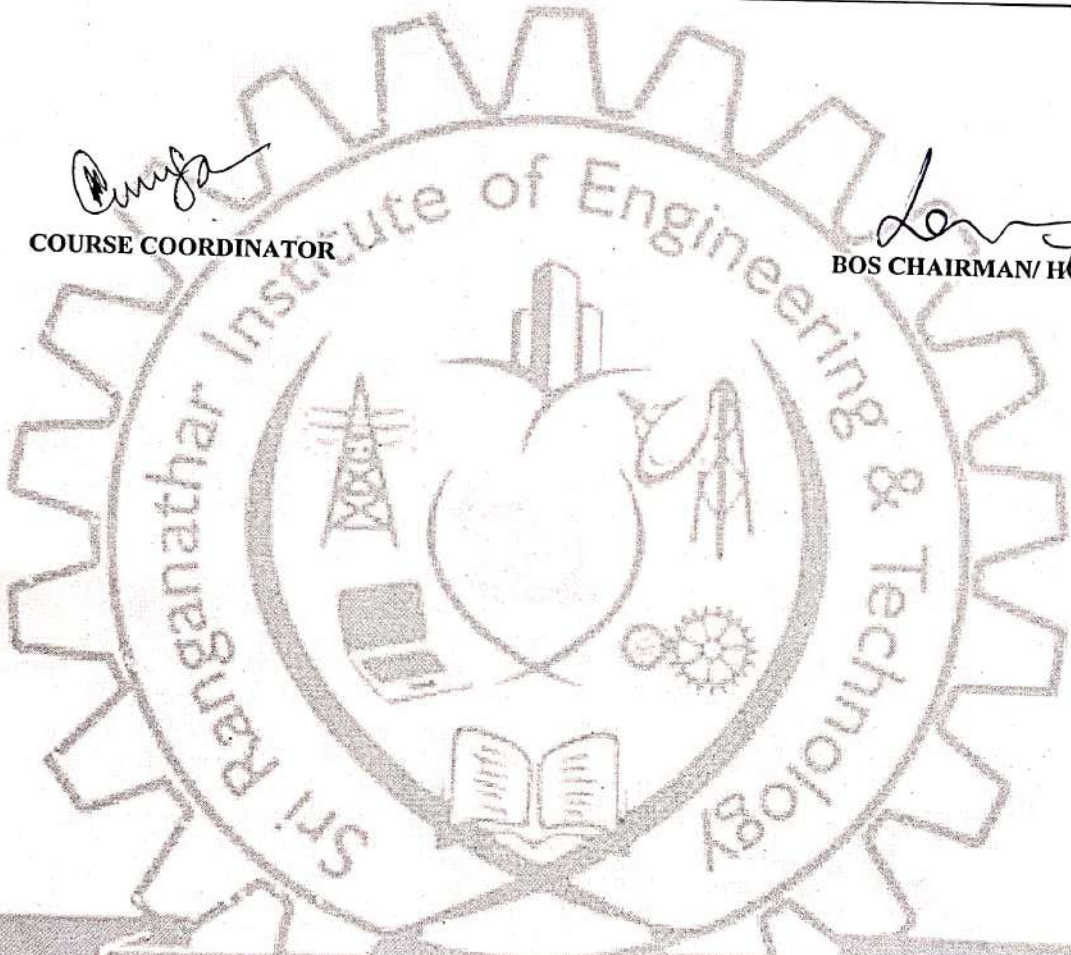
CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	2				3							3	
2	3	2	2	2	3							3	
3			2		3							3	2
4					3	2						3	
Low (1) ; Medium (2) ; High (3)												3	

*[Signature]*

COURSE COORDINATOR

*[Signature]*

BOS CHAIRMAN/HOD



*Position your profession*



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24GE3172

SOFT SKILLS I

L	T	P	C
0	0	2	1

### COURSE OBJECTIVES:

1. To build verbal competence by improving skills in verbal analogy, sentence structuring, error spotting, and contextual language use.
2. To develop effective listening and communication strategies by overcoming barriers and applying the principles of the 7C's of communication.
3. To enhance interpersonal skills through training in group decision-making, negotiation, and paralanguage for professional settings.
4. To foster personal and professional development through self-grooming, SWOT analysis, and effective communication etiquette.

### UNIT I VERBAL COMPETENCE

10

1. Verbal Analogy
2. Cloze Test
3. Corporate vocabulary

### UNIT II EFFECTIVE COMMUNICATION

10

1. Overcoming Communication Barriers
2. Body Language and its Etiquette
3. 7C's of Communication

### UNIT III INTERPERSONAL SKILLS

10

1. Group Decision Making
2. Negotiation Skills
3. Self-Grooming & SWOT analysis

**TOTAL: 30 PERIODS**

  
Course Coordinator

[D. Indumathi]  
AP/Eng.

  
BoS Chairman / HoD (S&H)



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24HS3252

PROFESSIONAL ENGLISH

L	T	P	C
2	0	0	2

**COURSE OBJECTIVES:**

1. Develop strategies and skills to augment their ability to read and comprehend engineering and technology texts.
2. Foster their ability to write convincing job applications and effective reports.
3. Develop their speaking skills to make technical presentations and participate in group discussions.
4. Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialization.

**UNIT I                    APPLIED ENGLISH FOR TECHNICAL CONTEXTS                    6**

Listening: Listening to motivational speech-Speaking: Asking for and giving directions -Reading: Reading short technical texts from newspapers and magazines -Writing: Extended definitions, checklists, recommendation-Vocabulary Development: Technical vocabulary, abbreviations - Language Development: Mixed tenses

**UNIT – II                    TECHNICAL DOCUMENTATION AND COMMUNICATION                    6**

Listening: Listening to TED talks-Speaking: Describing a process, narrating a story-Reading:Reading advertisements, summarizing -Writing: Interpreting charts, graphs, Formal Letters (Quotations, Clarification, Placing orders & Complaint letters)-Vocabulary-Development: Vocabulary used in formal letters/emails and reports -Language Development: British and American spelling, numerical adjectives.

**UNIT – III                    INTEGRATED SKILLS FOR ACADEMIC ENGLISH                    6**  
**PROFICIENCY**

Listening: Listening to classroom lectures, commentaries Speaking: Oral presentations -Reading: User manuals, speed reading techniques-Writing: Process writing, Use of sequence words, Analytical essays and issue-based essays -Vocabulary Development: Sequence words, misspelled words-Language Development: Identifying different types of sentences

**UNIT – IV                    JOB READINESS AND CAREER SKILLS                    6**

Listening: Listening to documentaries, listening to virtual interviews Speaking: Mock interview Reading: Reading for detailed comprehension Writing: Email writing, Job application- Résumé preparation, Vocabulary Development: Finding suitable synonyms, Paraphrasing Language Development: Clauses, If conditionals

**UNIT – V                    REPORTS AND COLLABORATIVE SPEAKING                    6**

Listening: Listening to talks based on the profession -Speaking: Participating in a group discussion - Reading: Reading pictography-Writing: Writing reports- feasibility, Survey and Industrial reports -Vocabulary Development: one-word substitution-Language Development: Reported speech, Active and Passive voice, Impersonal passive

**TOTAL: 30 PERIODS**



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### COURSE OUTCOMES:

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

- CO1 Develop listening skills effectively in both academic and professional settings.
- CO2 Enhance speaking skills by engaging confidently in technical and professional discussions.
- CO3 Practice and refine reading techniques to efficiently extract key information from academic and technical texts.
- CO4 Gains expertise in writing various forms of academic and professional documents.
- CO5 Expand corporate vocabulary and gain job readiness through career-oriented tasks.

### TEXT BOOKS:

1. Tom Hutchinson and Alan Waters, English for Specific Purposes: A Learning-Centered Approach, Cambridge University Press, 2019.
2. Paul Emmerson, English for Careers: Business, Professional, and Technical English, Cambridge University Press, 2008.

### REFERENCES:

1. Michael Swan, Practical English Usage, Oxford University Press, 2005.
2. Gerald J. Alred, Charles T. Brusaw, and Walter E. Oliu, The Handbook of Technical Writing, St. Martin's Press, 2018.
3. M. Ashraf Rizvi, Business Communication, Tata McGraw-Hill Education, 2010.
4. M. K. Murthy, English for Engineers and Technologists, Wiley, 2014.

### CO's-PO's & PSO's MAPPING:

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	1	1	1	1	1	3	3	1	3		3		
2	1	1	1	1	1	3	3	1	3		3		
3	2	3	2	3	2	3	3	2	3	3	3		
4	2	3	2	3	2	3	3	2	3	3	3		
5	2	3	3	3		3	3	2	3		3		

Low (1) ; Medium (2) ; High (3)

*D. Indumathi*  
Course Coordinator

[D. INDUMATHI]  
AP/Eng.

*Devi*  
BoS Chairman / HoD (S&H)



<b>24MA3252</b>	<b>LINEAR ALGEBRA, STATISTICS AND NUMERICAL METHODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**COURSE OBJECTIVES:**

1. To introduce the basic notions of vector spaces which will then be used to solve related problems
2. To understand the concepts of linear transformations, inner product spaces and orthogonalization.
3. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
4. To introduce the basic concepts of solving algebraic and transcendental equations.
5. To acquaint the knowledge of various techniques and methods of solving ordinary differential equations

**UNIT I VECTOR SPACES 9+3**

Vector spaces – Subspaces – Linear combinations and linear system of equations – Linear independence and linear dependence – Bases and dimensions.

**UNIT – II LINEAR TRANSFORMATION AND INNER PRODUCT SPACES 9+3**

Linear transformation - Null spaces and ranges - Dimension theorem - Matrix representation of a linear transformations - Inner product - Norms - Gram Schmidt orthogonalization process

**UNIT – III TESTING OF HYPOTHESIS 9+3**

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes.

**UNIT – IV SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method for symmetric matrices.

**UNIT – V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9+3**

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's predictor corrector method for solving first order differential equations.

**TOTAL: 45+15 PERIODS**



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### COURSE OUTCOMES:

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

- CO1 Explain the fundamental concepts of vector space and their role in mathematics and applied contexts.
- CO2 Demonstrate accurate and efficient use of linear transformation and its application in engineering.
- CO3 Apply the concept of testing of hypothesis for small and large samples in real life problems.
- CO4 Understand the knowledge of various techniques and methods for solving algebraic and transcendental equations.
- CO5 Solve the first order ordinary differential equations with initial conditions by using various numerical techniques with engineering applications.

### TEXT BOOKS:

1. Friedberg. A.H., Insel. A.J. and Spence. L., "Linear Algebra", Prentice Hall of India, New Delhi, 4<sup>th</sup> Edition, 2004.
2. Grewal, B.S. and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10<sup>th</sup> Edition, New Delhi, 2015.
3. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8<sup>th</sup> Edition, 2015.

### REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9<sup>th</sup> Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8<sup>th</sup> Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7<sup>th</sup> Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12<sup>th</sup> Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4<sup>th</sup> Edition, 2012.
6. Kolman. B. Hill. D.R., "Introductory Linear Algebra", Pearson Education, New Delhi, First Reprint, 2009.

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
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1	3	3	1	1				2		2	3		
2	3	3	1	1				2		2	3		
3	3	3	1	1				2		2	3		
4	3	3	1	1				2		2	3		
5	3	3	1	1				2		2	3		

Low (1) ; Medium (2) ; High (3)

Course Coordinator

BOS Chairman/ HoD(S&H)



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24AD3251

## DATA STRUCTURES DESIGN

L	T	P	C
3	0	0	3

### COURSE OBJECTIVES:

1. To understand the concepts of ADTs
2. To design linear data structures – lists, stacks, and queues
3. To understand sorting, searching and hashing algorithms
4. To apply Tree and Graph structures

### UNIT I      ABSTRACT DATA TYPES

9

Abstract Data Types (ADTs) - ADTs and classes – introduction to OOP -classes in Python - inheritance -namespaces -shallow and deep copying -Introduction to analysis of algorithms - asymptotic notations - recursion -analyzing recursive algorithms

### UNIT II      LINEAR STRUCTURES

9

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

### UNIT III     SORTING AND SEARCHING

9

Bubble sort – selection sort - insertion sort – merge sort -quick sort- linear search - binary search - hashing -hash functions - collision handling – load factors, rehashing, and efficiency

### UNIT IV     TREE STRUCTURES

9

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

### UNIT V      GRAPH STRUCTURES

9

Graph ADT -representations of graph -graph traversals -DAG -topological ordering -shortest paths -minimum spanning trees

**TOTAL: 45 PERIODS**

### COURSE OUTCOMES:

**At the end of the course, the student shall be able to:**

- CO1 Explain abstract data types
- CO2 Design, implement, and analyse linear data structures, such as lists, queues and stacks, according to the needs of different applications
- CO3 Design, implement and analyse efficient tree structures to meet requirements such as searching, indexing and sorting.
- CO4 Model problems as graph problems and implement efficient graph algorithms to solve Them.



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### TEXT BOOKS:

1. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, "Data Structures and Algorithms in Python" (An Indian Adaptation), Wiley, 2021.
2. Lee, Kent D., Hubbard, Steve, "Data Structures and Algorithms with Python" Springer Edition 2015.
3. Narasimha Karumanchi, "Data Structures and Algorithmic Thinking with Python" Careermonk, 2015.

### REFERENCES:

1. Rance D. Necaie, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning, 2010.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2014
4. Aho, Hopcroft, and Ullman, "Data Structures and Algorithms", Pearson Education India, 2002

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3	3	2	2	2			2	2	2	2		2	2
4	3	2	2	2			2	2	2	2		2	2
5	3	2	2	2			2	2	1	1		2	2

**Low (1) ; Medium (2) ; High (3)**

  
Course Coordinator

  
BoS Chairman/HoD



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24BE3051

### BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVES:

1. To introduce the basics of electric circuits and analysis.
2. To impart knowledge in the basics of working principles and application of electrical machines.
3. To introduce analog devices and their characteristics.
4. To educate on the fundamental concepts of digital electronics.
5. To introduce the functional elements and working of measuring instruments.

#### UNIT – I

#### ELECTRICAL CIRCUITS

9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm’s Law - Kirchhoff’s Laws — Simple problems, Mesh analysis with independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)

#### UNIT – II

#### ELECTRICAL MACHINES

9

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, working principle and Applications of Transformer (single phase), Three Phase Induction Motor.

#### UNIT – III

#### ANALOG ELECTRONICS

9

Resistor, Inductor and Capacitor in Electronic Circuits- PN Junction Diodes, Zener Diode Characteristics Applications Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET, IGBT Types, I-V Characteristics and Applications.

#### UNIT – IV

#### DIGITAL ELECTRONICS

9

Review of number systems, binary codes, Combinational logic - representation of logic functions- SOP and POS forms, K-map representations -minimization using K maps (Simple Problems only).

#### UNIT – V

#### MEASUREMENTS AND INSTRUMENTATION

9

Functional elements of an instrument, Standards and calibration, Operating Principle, types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT, DSO- Block diagram.

**TOTAL: 45 PERIODS**



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### COURSE OUTCOMES:

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

- CO1 Compute the electric circuit parameters for simple problems.
- CO2 Explain the working principle and applications of electrical machines.
- CO3 Analyze the characteristics of Analog electronic devices.
- CO4 Explain the basic concepts of digital electronics.
- CO5 Explain the operating principles of measurement instruments.

### TEXT BOOKS:

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2. S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
3. Sedha R.S., "A text book book of Applied Electronics", S. Chand & Co., 2008.
4. James A. Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
5. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.


### REFERENCES:

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", Fourth Edition, McGraw Hill Education, 2019.
2. Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017.
3. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7th edition, 2017.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

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3	3	3	3	1	2	2	1	1	1	1	2	3	3
4	3	3	2	2	2	2	1	1	1	1	2	2	3
5	3	2	3	2	2	2	1	1	1	1	2	3	3

Low (1) ; Medium (2) ; High (3)

  
Course Coordinator

  
BOS Chairman/HOD



24GE3252

தமிழர் தொழில்நுட்பம்

L T P C  
1 0 0 1

**COURSE OBJECTIVES:**

1. பண்டைய தமிழரின் தொழில்நுட்பத் திறன்கள் பற்றி அறிதல்.
2. வழிபாட்டு கட்டிடக் கலையின் பரிணாம வளர்ச்சியை அறிதல்.
3. பண்டைய உற்பத்தி நுட்பங்களை மதிப்பீடு செய்தல்.
4. வேளாண்மை மற்றும் நீர்ப்பாசன முறைகளின் நவீன முன்னோடிகளைக் கண்டறிதல்.
5. தமிழில் அறிவியல் மற்றும் கணினி நுட்பங்களை அறிந்து பயன்படுத்து திறன் வளர்த்தல்.

**அலகு I நெசவு மற்றும் பானை தொழில் நுட்பம் 3**

சங்க காலத்தில் நெசவுத் தொழில் - பானை தொழில் நுட்பம் - கருப்பு மற்றும் சிவப்பு மட்பாண்டங்கள்.

**அலகு - II வடிவமைப்பு மற்றும் கட்டுமான தொழில் நுட்பம் 3**

சங்க காலத்தில் வீட்டு வடிவமைப்புகள் - சங்க கால கட்டுமானப் பொருட்கள் - மாமல்லபுரத்தின் சிற்பங்கள் மற்றும் கோயில்கள் - சோழர்களின் பெரிய கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் கால கோயில்கள் - செட்டி நாட்டு வீடுகள்.

**அலகு- III உற்பத்தி தொழில்நுட்பம் 3**

கப்பல் கட்டும் கலை - இரும்புத் தொழில் - இரும்பு உருக்குதல் - செம்பு மற்றும் தங்க நாணயங்கள் - மணிகள் தயாரிக்கும் தொழில்கள் - கல் மணிகள் - கண்ணாடி மணிகள் - ஓடு மணிகள் - எலும்பு மணிகள்.

**அலகு - IV வேளாண்மை மற்றும் நீர்ப்பாசன தொழில்நுட்பம் 3**

அணை, குளம், குளங்கள், மதகு, சோழர் கால குமிழி தூம்புவின் முக்கியத்துவம், கால்நடை பராமரிப்பு - விவசாயம் மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல் பற்றிய அறிவு - மீன்பிடித்தல் - முத்து மற்றும் முத்துக்குளித்தல்.

**அலகு -V அறிவியல் தமிழ் மற்றும் தமிழ்கணினி 3**

அறிவியல் தமிழ் வளர்ச்சி - தமிழ் கணினிமயமாக்கல் - தமிழில் இணையம் மற்றும் தகவல் தொடர்பு சாதனங்கள் -தமிழ் எழுதும் எழுத்துருக்கள் - தமிழில் தொழில்நுட்ப சொற்கள் - தமிழ் இணையக் கல்விக்கழகம்- தமிழ் மின் நூலகம்- மின் இதழ்கள்.

**TOTAL: 15 PERIODS**



# SRI RANGANATHAR

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24GE3252

TAMILS AND TECHNOLOGY

L	T	P	C
1	0	0	1

### COURSE OBJECTIVES:

1. To understand the technological skills of the ancient Tamils.
2. To study the evolutionary development of temple architecture.
3. To evaluate ancient production techniques.
4. To identify the ancient precedents of modern agricultural and irrigation practices.
5. To develop the ability to understand and use scientific and computer technologies in Tamil.

### UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

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

### UNIT – II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Chetti Nadu Houses,

### UNIT – III MANUFACTURING TECHNOLOGY 3

. Art of Ship Building - 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 beads.

### UNIT – IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoempu of Chola Period, Animal Husbandry - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving .

### UNIT – V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Tamil Digital Library – Internet and Information Communication Devices in Tamil – Tamil Writing Fonts – Technical Terms in Tamil – Tamil Virtual Academy – Tamil E-Library.



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## பாடநூல் / TEXT BOOKS:

1. தமிழக வரலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் -முனைவர் இல, சுந்தரம், (விகடன் பிரசுரம்).
3. சீழடி வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருளை ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL-(in print)
6. Social Life of the Tamils The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

## பார்வை நூல் : REFERENCES:

1. The Contributions of the Tamils to Indian Culture (Dr.M. Valarmathi) (Published by: International Institute of Tamil Studies).
2. Keeladi - 'Sangam City Civilization on the banks of river Vaigai (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author).
3. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
4. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

  
Course Coordinator

  
BoS Chairman / HoD (S&H)

NCC Credit Course Level 1\*

24NX3251

(ARMY WING) NCC Credit Course Level - I

L T P C  
2 0 0 2

**NCC GENERAL**

- NCC 1 Aims, Objectives & Organization of NCC  
NCC 2 Incentives  
NCC 3 Duties of NCC Cadet  
NCC 4 NCC Camps: Types & Conduct

6

1

2

1

2

**NATIONAL INTEGRATION AND AWARENESS**

- NI 1 National Integration: Importance & Necessity  
NI 2 Factors Affecting National Integration  
NI 3 Unity in Diversity & Role of NCC in Nation Building  
NI 4 Threats to National Security

4

1

1

1

1

**PERSONALITY DEVELOPMENT**

- PD 1 Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving  
PD 2 Communication Skills  
PD 3 Group Discussion: Stress & Emotions

7

2

3

2

**LEADERSHIP**

- L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour 'Code  
L 2 Case Studies: Shivaji, Jhansi Ki Rani

5

3

2

**SOCIAL SERVICE AND COMMUNITY DEVELOPMENT**

- SS 1 Basics, Rural Development Programmes, NGOs, Contribution of Youth  
SS 4 Protection of Children and Women Safety  
SS 5 Road / Rail Travel Safety  
SS 6 New Initiatives  
SS 7 Cyber and Mobile Security Awareness

8

3


1

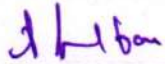
1

2

1

TOTAL : 30 PERIODS

  
COURSE COORDINATOR

  
BOS CHAIRMAN

### NCC Credit Course Level 1\*

24NX3252

(NAVAL WING) NCC Credit Course Level - I

L T P C  
2 0 0 2

#### NCC GENERAL

NCC 1	Aims, Objectives & Organization of NCC	1
NCC 2	Incentives	2
NCC 3	Duties of NCC Cadet	1
NCC 4	NCC Camps: Types & Conduct	2

#### NATIONAL INTEGRATION AND AWARENESS

NI 1	National Integration: Importance & Necessity	1
NI 2	Factors Affecting National Integration	1
NI 3	Unity in Diversity & Role of NCC in Nation Building	1
NI 4	Threats to National Security	1

#### PERSONALITY DEVELOPMENT

PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem-Solving	2
PD 2	Communication Skills	3
PD 3	Group Discussion: Stress & Emotions	2

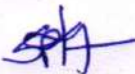
#### LEADERSHIP

L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code	3
L 2	Case Studies: Shivaji, Jhasi Ki Rani	2

#### SOCIAL SERVICE AND COMMUNITY DEVELOPMENT

SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth	3
SS 4	Protection of Children and Women Safety	1
SS 5	Road / Rail Travel Safety	1
SS 6	New Initiatives	2
SS 7	Cyber and Mobile Security Awareness	1

TOTAL : 30 PERIODS

  
COURSE COORDINATOR


  
BOS CHAIRMAN

### NCC Credit Course Level 1\*

24NX3253	(AIR FORCE WING) NCC Credit Course Level - I	L	T	P	C
		2	0	0	2
<b>NCC GENERAL</b>					<b>6</b>
NCC 1	Aims, Objectives & Organization of NCC				1
NCC 2	Incentives				2
NCC 3	Duties of NCC Cadet				1
NCC 4	NCC Camps: Types & Conduct				2
<b>NATIONAL INTEGRATION AND AWARENESS</b>					<b>4</b>
NI 1	National Integration: Importance & Necessity				1
NI 2	Factors Affecting National Integration				1
NI 3	Unity in Diversity & Role of NCC in Nation Building				1
NI 4	Threats to National Security				1
<b>PERSONALITY DEVELOPMENT</b>					<b>7</b>
PD 1	Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving				2
PD 2	Communication Skills				3
PD 3	Group Discussion: Stress & Emotions				2
<b>LEADERSHIP</b>					<b>5</b>
L 1	Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code				3
L 2	Case Studies: Shivaji, Jhansi Ki Rani				2
<b>SOCIAL SERVICE AND COMMUNITY DEVELOPMENT</b>					<b>8</b>
SS 1	Basics, Rural Development Programmes, NGOs, Contribution of Youth				3
SS 4	Protection of Children and Women Safety				1
SS 5	Road / Rail Travel Safety				1
SS 6	New Initiatives				2
SS 7	Cyber and Mobile Security Awareness				1

**TOTAL : 30 PERIODS**

  
COURSE COORDINATOR

  
BOS CHAIRMAN



24PH3051

ENGINEERING PHYSICS

L	T	P	C
3	0	2	4

**COURSE OBJECTIVES:**

1. To make the students effectively achieve an understanding the basics of Properties of Matter and its applications.
2. To introduce the basics of optics and lasers and its applications.
3. To enable the students to gain knowledge of fiber optic technology and its applications.
4. Equipping the students to successfully understand the importance of Thermal properties.
5. To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device applications.

**UNIT I** **PROPERTIES OF MATTER** **9**

**Elasticity** - Stress-strain diagram and its uses - Factors affecting elastic modulus - Torsional stress and deformations - Torsional pendulum: theory and experiment.

**Bending of beams** - Bending moment - Cantilever: theory and experiment- Uniform and non-uniform bending: theory and experiment.

**UNIT – II** **OPTICS AND LASERS** **9**

**Optics**: Reflection and refraction of light waves – Total internal reflection – Interference – Theory of Air-wedge experiment.

**LASER**: Principle of Spontaneous emission and stimulated emission. Population inversion, pumping methods- Einstein's A and B coefficients: derivation. Types of Lasers - Semiconductor Laser-homojunction and heterojunction - Industrial applications of Laser.

**UNIT – III** **FIBER OPTIC TECHNOLOGY** **9**

Principle and propagation of light - Numerical aperture and Acceptance angle - Types of optical fibers (material, refractive index, mode) - Fiber optic communication System - Block diagram – Fiber optic sensors – temperature and displacement – Endoscope.

**UNIT – IV** **THERMAL PHYSICS** **9**

Transfer of heat energy – thermal expansion of solids and liquids – bimetallic strips - thermal conduction, convection and radiation– thermal conductivity - Lee's disc method: (theory only) - conduction through compound media (series and parallel) – thermal insulation – applications: refrigerators, ovens and solar water heaters.

**UNIT – V** **NANO DEVICES** **9**

Introduction - quantum confinement – quantum structures: quantum wells, wires and dots — band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade – resonant tunneling diode – single electron transistor - Carbon nanotubes: Properties and applications - Optics in quantum structures – quantum well laser.

**TOTAL: 45 PERIODS**

**LIST OF EXPERIMENTS (Any 5)**

1. Determination of rigidity modulus of wire and moment of inertia of the disc -Torsional pendulum.
2. Determination of Young's modulus by uniform bending method.
3. Determination of Young's modulus by non-uniform bending method.



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4. Simple harmonic oscillations of cantilever and Find young's modulus of the bar.
5. Determination of thickness of a thin wire by using travelling microscope – Air wedge method.
6. Determination of wavelength of the Laser using grating.
7. Determination of Numerical aperture and acceptance angle of an optical fiber.

**TOTAL: 30 PERIODS**

**TOTAL : 45+30 = 75 PERIODS**

### COURSE OUTCOMES:

**At the end of the course the students will be able to**

- CO1** Understand the importance of properties of matter, elastic behaviour and Bending moment of materials.
- CO2** Demonstrate a strong foundational knowledge in optics and laser, the thickness of the thin materials by using interference concept.
- CO3** Express their knowledge in fiber optic technology.
- CO4** Understand the importance of thermal properties of materials.
- CO5** Understand the basics of quantum structures and their applications.

### TEXT BOOKS:

1. Bhattacharya D K and Poonam Tandon, “Engineering Physics”, 2<sup>nd</sup> edition, Oxford University Press, Chennai, 2017
2. Marikani A, “Engineering Physics”, 3<sup>rd</sup> edition, PHI publishers, Chennai, 2021.
3. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.
4. Gaur, R.K. & Gupta, S.L. “Engineering Physics”. Dhanpat Rai Publishers, 2012.

### REFERENCES:

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

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	1	2										
2	3	1	2										
3	3	1	2										
4	3	1	1										
5	3	1	1										

**Low (1) ; Medium (2) ; High (3)**

**Course Coordinator**

**BoS Chairman / HoD (S&H)**

**COURSE OBJECTIVES:**

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

**PART I****GROUP – A (CIVIL & ELECTRICAL)****CIVIL ENGINEERING PRACTICES****15****PLUMBING WORK:**

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

**WOOD WORK:**

1. Sawing,
2. Planing and
3. Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

**PART II****ELECTRICAL ENGINEERING PRACTICES****15**

1. Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket
2. Staircase wiring
3. Fluorescent Lamp wiring with introduction to CFL and LED types.
4. Energy meter wiring and related calculations/ calibration
5. Study of Iron Box wiring and assembly
6. Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)
7. Study of emergency lamp wiring/Water heater

**GROUP – B (MECHANICAL AND ELECTRONICS)****PART III****MECHANICAL ENGINEERING PRACTICES****15****WELDING WORK:**

1. Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
2. Practicing gas welding.

**BASIC MACHINING WORK:**

1. (simple)Turning.
2. (simple)Drilling.

3. (simple)Tapping.

**SHEET METAL WORK:**

1. Making of a square tray

**PART IV**

**ELECTRONIC ENGINEERING PRACTICES**

15

**SOLDERING WORK:**

1. Soldering simple electronic circuits and checking continuity.

**ELECTRONIC ASSEMBLY AND TESTING WORK:**

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

**ELECTRONIC EQUIPMENT STUDY:**

1. Study an element of smart phone.
2. Assembly and dismantle of LED TV.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

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

- CO1 Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
- CO2 Wire various electrical joints in common household electrical wire work.
- CO3 Weld various joints in steel plates using arc welding work;.
- CO4 Machine various simple processes like turning, drilling, tapping in parts; Make a tray out of metal sheet using sheet metal work.
- CO5 Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

**CO's-PO's & PSO's MAPPING**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	2	2		2					1	2	2	
2	3	2	2		2					1	2	2	
3	3	2	2		2					1	2	2	
4	3	2	2		2					1	2	2	
5	3	2	2		2					1	2	2	

Low (1) ; Medium (2) ; High (3)

*M. Chauhan*  
Course Coordinator

*J. Singh*  
BoS Chairman/HoD

Chairman - Board of Studies  
Department Of Mechanical Engineering  
Sri Ranganathar Institute of Engineering and Technology  
Coimbatore - 641 110.



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24AD3271 DATA STRUCTURES DESIGN LABORATORY

L T P C  
0 0 4 2

### COURSE OBJECTIVES:

1. To implement ADTs in Python
2. To design and implement linear data structures – lists, stacks, and queues
3. To implement sorting, searching and hashing algorithms
4. To solve problems using tree and graph structures

### LIST OF EXPERIMENTS:

Note: The lab instructor is expected to design problems based on the topics listed. The

Examination shall not be restricted to the sample experiments designed.

1. Implement simple ADTs as Python classes
2. Implement recursive algorithms in Python
3. Implement List ADT using Python arrays
4. Linked list implementations of List
5. Implementation of Stack and Queue ADTs
6. Applications of List, Stack and Queue ADTs
7. Implementation of sorting and searching algorithms
8. Implementation of Hash tables
9. Tree representation and traversal algorithms
10. Implementation of Binary Search Trees
11. Implementation of Heaps
12. Graph representation and Traversal algorithms
13. Implementation of single source shortest path algorithm
14. Implementation of minimum spanning tree algorithms

### COURSE OUTCOMES:

At the end of the course, the student shall be able to:

- CO1** Implement ADTs as Python classes
- CO2** Design, implement and analyse linear data structures, such as lists, queues, and stacks, according to the needs of different applications
- CO3** Design, implement and analyse efficient tree structures to meet requirements such as searching, indexing and sorting
- CO4** Model problems as graph problems and implement efficient graph algorithms to solve them.

**TOTAL:60 PERIODS**

### TEXT BOOKS:

1. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, "Data Structures and Algorithms in Python" (An Indian Adaptation), Wiley, 2021.
2. Lee, Kent D., Hubbard, Steve, "Data Structures and Algorithms with Python" Springer Edition 2015.
3. Narasimha Karumanchi, "Data Structures and Algorithmic Thinking with Python"



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Careermonk, 2015.

**REFERENCES:**

1. Rance D. Necaie, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning, 2010.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2014
4. Aho, Hopcroft, and Ullman, "Data Structures and Algorithms", Pearson Education India, 2002.

**CO's-PO's & PSO's MAPPING**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	3	3	3			3	3	3	3		3	3
2	3	3	3	3			3	3	3	3		3	3
3	3	2	2	2			2	2	2	2		2	2
4	3	2	2	2			2	2	2	2		2	2
5	3	2	2	2			2	2	1	1		2	2

**Low (1) ; Medium (2) ; High (3)**

  
Course Coordinator

  
BoS Chairman/HoD



24GE3272

SOFT SKILLS II

L	T	P	C
0	0	2	1

**COURSE OBJECTIVES:**

1. To develop effective presentation skills through structured techniques, body language, and time management.
2. To enhance group discussion and public speaking abilities by fostering confidence, strategic thinking, and audience engagement.
3. To equip learners with essential interview skills, including preparation, etiquette, and handling various interview formats.
4. To improve professional communication and soft skills required for academic, corporate, and real-world scenarios.

**UNIT I PRESENTATION SKILLS 10**

1. Presentation techniques
2. Virtual presentation
3. Public speaking

**UNIT II GROUP DISCUSSION AND PUBLIC SPEAKING 10**

1. Introduction to Group Discussion
2. Group Discussion Strategies
3. Activities to improve GD skills

**UNIT III INTERVIEW SKILLS 10**

1. Listening to Interviews
2. Interview Techniques and Etiquette
3. Online Interview Techniques

**TOTAL: 30 PERIODS**

*D. Indumathi*

Course Coordinator

*(D. Indumathi)*  
AP/Eng.

*[Signature]*

BoS Chairman / HoD (S&H)



24MA3391

PROBABILITY AND STATISTICS

L	T	P	C
3	1	0	4

**COURSE OBJECTIVES:**

1. Equip students with statistical problem-solving skills for engineering applications
2. Introduce fundamental concepts of probability, random variables, and bivariate distributions
3. Develop understanding of hypothesis testing for small and large samples.
4. Familiarize students with design of experiments and its practical applications in fields like agriculture and quality control.

<b>UNIT I</b>	<b>PROBABILITY AND RANDOM VARIABLES</b>	<b>9+3</b>
Axioms of probability – Conditional probability – Baye’s theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions – Functions of a random variable.		
<b>UNIT – II</b>	<b>TWO- DIMENSIONAL RANDOM VARIABLES</b>	<b>9+3</b>
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).		
<b>UNIT – III</b>	<b>ESTIMATION THEORY</b>	<b>9+3</b>
Unbiased estimators - Efficiency - Consistency - Sufficiency - Robustness - Method of moments - Method of maximum Likelihood - Interval estimation of Means - Differences between means, variations and ratio of two variances.		
<b>UNIT – IV</b>	<b>NON- PARAMETRIC TESTS</b>	<b>9+3</b>
Introduction - The Sign test - The Signed - Rank test - Rank - sum tests - The U test - The H test - Tests based on Runs - Test of randomness - The Kolmogorov Tests.		
<b>UNIT – V</b>	<b>STATISTICAL QUALITY CONTROL</b>	<b>9+3</b>
Control charts for measurements ( $\bar{x}$ and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.		

**TOTAL: 45+15 PERIODS**

**COURSE OUTCOMES:**

**At the end of the course the students will be able to**

- CO1** Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- CO2** Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.
- CO3** Apply the concept of testing of hypothesis for small and large samples in real life problems.



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- CO4** Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
- CO5** Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

**TEXT BOOKS:**

1. Johnson. R.A., Miller. I.R and Freund. J.E, " Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 9<sup>th</sup> Edition, 2016.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata Mc Graw Hill, 4<sup>th</sup> Edition, 2007.
3. John E. Freund, "Mathematical Statistics", Prentice Hall, 5<sup>th</sup> Edition, 1992.

**REFERENCES:**

1. Gupta. S.C. and Kapoor. V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12<sup>th</sup> Edition, 2020.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8<sup>th</sup> Edition, 2014.
3. Ross. S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5<sup>th</sup> Edition, Elsevier, 2014.
4. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 4<sup>th</sup> Edition, 2012.
5. 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.

**CO's-PO's & PSO's MAPPING:**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	3			0	0	0	2			2		
2	3	3			0	0	0	2			2		
3	3	3			0	0	0	2			2		
4	3	3	3	2	0	0	0	2			2		
5	3	3	3	2	0	0	0	2			2		
<b>Low (1) ; Medium (2) ; High (3)</b>													

  
Course Coordinator

  
BOS Chairman/ HoD(S&H)



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<b>24AL3391</b>	<b>ARTIFICIAL INTELLIGENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3

**COURSE OBJECTIVES:**

1. Learn the basic AI approaches
2. Develop problem solving agents
3. Perform logical and probabilistic reasoning

<b>UNIT – I</b>	<b>INTELLIGENT AGENTS</b>	<b>9</b>
Introduction to AI – Agents and Environments – concept of rationality – nature of environments – structure of agents. Problem solving agents – search algorithms – uninformed search strategies.		
<b>UNIT – II</b>	<b>PROBLEM SOLVING</b>	<b>9</b>
Heuristic search strategies – heuristic functions. Local search and optimization problems – local search in continuous space – search with non-deterministic actions – search in partially observable environments – online search agents and unknown environments		
<b>UNIT – III</b>	<b>GAME PLAYING AND CSP</b>	<b>9</b>
Game theory – optimal decisions in games – alpha-beta search – monte-carlo tree search – stochastic games – partially observable games. Constraint satisfaction problems – constraint propagation – backtracking search for CSP – local search for CSP – structure of CSP.		
<b>UNIT – IV</b>	<b>LOGICAL REASONING</b>	<b>9</b>
Knowledge-based agents – propositional logic – propositional theorem proving – propositional model checking – agents based on propositional logic. First-order logic – syntax and semantics – knowledge representation and engineering – inferences in first-order logic – forward chaining – backward chaining – resolution.		
<b>UNIT – V</b>	<b>PROBABILISTIC REASONING</b>	<b>9</b>
Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.		

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

**At the end of the course the students will be able to**

- CO1** Explain intelligent agent frameworks
- CO2** Apply problem solving techniques
- CO3** Apply game playing and CSP techniques
- CO4** Perform logical reasoning
- CO5** Perform probabilistic reasoning under uncertainty

**TEXT BOOKS:**



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1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.

## REFERENCES:

1. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007
2. Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008
3. Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006
4. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013.
5. <http://nptel.ac.in/Devore>. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.

## CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	1	3	3				2	3	3	1	2	1
2	2	2	1	1	1			2	2	3	1	3	2
3	2	1	2	1				2	1	1	3	1	2
4	2	1	2	2				2	1	2	2	1	3
5	3	2	2	1	1			3	2	1	2	2	2

Low (1) ; Medium (2) ; High (3)

A-DCP  
Course Coordinator

Sanjay P.  
BoS Chairman/HoD

Parthenon your profession



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24ME3492

### FUNDAMENTAL OF PROGRAMMING

L	T	P	C
3	0	0	3

#### COURSE OBJECTIVES:

1. To understand the basic organization of computers and the working of programming languages.
2. To learn the fundamentals of C programming including variables, data types, operators, and control structures.
3. To develop the ability to write modular programs using functions and arrays.
4. To understand and apply the concepts of structures, unions, and pointers for effective memory management.
5. To develop the skills to handle file operations for data storage and retrieval in C programming.

#### UNIT I INTRODUCTION TO C PROGRAMMING 9

Programming Language, Compiler, Interpreter, Linker, Loader, Classification of Programming, Algorithm, Flowchart, Structure of a C Program, First C Program, Comments, C Tokens, Basic data types in C, Variables, Operators & Expression in C, Type conversion and Typcasting.

#### UNIT - II CONTROL STRUCTURES AND I/O OPERATIONS IN C 9

Basic Screen & Keyboard Input & Output, Introduction to Decision Control Statements, Conditional execution & selection statements, Iterative Statements, Nested Loops, Special Control Statement.

#### UNIT - III ARRAYS, STRINGS, AND FUNCTIONS IN C 9

Introduction to Array, One Dimensional Array, Multi-Dimensional Array, Introduction to String, Character & string Functions, Array of String. Introduction to User Defined Functions, Using Functions, Function Declaration / Function Prototype, Function Definition, Function call, return statement, Passing Parameters to the function, scope of variables, Storage classes, Recursive Functions

#### UNIT -IV POINTERS, STRUCTURES, AND UNIONS 9

Introduction, Understanding Memory Addresses, Address Operator (&), Introduction to Pointers, Void Pointer, Null Pointer, Use of Pointers, Arrays and Pointers, Pointer and String, Pointer Arithmetic, Pointers to Pointers, Array of Pointers, Pointers to an Array, Pointers to Functions. Structure, Structure Declaration, Accessing member of structure, Initialization of Structure. Nesting of Structure, Array of Structure, Array within structure, Structure and Function, Structure and Pointer, Union.

#### UNIT - V FILE HANDLING IN C 9

Using Files in C, Declaration, Opening and Closing of a File, Working with Text Files and Binary Files, Character Input and Output, End of File (EOF), feof() Function, Files of Records, Random Access to Files of Records.

**TOTAL: 45 PERIODS**



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### OUTCOMES:

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

- CO1 Understand the basic concepts of programming languages, compilers, and the structure of C programs.
- CO2 Apply decision-making and looping constructs to develop programs for real-world problems.
- CO3 Implement programs using arrays, strings, and modularize them using user-defined functions.
- CO4 Develop programs using structures, unions, and pointers to handle complex data structures.
- CO5 Apply file handling concepts for data storage, retrieval, and manipulation in C programming.

### TEXT BOOKS:

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

### REFERENCES:

1. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018.
2. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020.
3. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second 5. Edition, Oxford University Press, 2013.
5. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013

### CO's-PO's & PSO's MAPPING

CO	PO											PSO	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	1	2	2	1	2	1	1	1	2		3	1	1
2	2	2	2	1	2	1	1	1	2		3	1	1
3	2	3	2	1	2	1	1	1	2		3	1	1
4	3	2	2	1	3	1	1	1	2		3	1	1
5	2	3	3	1	2	1	2	1	2		3	1	3

Low (1) ; Medium (2) ; High (3)

*J. Jamil*  
Course Coordinator

*Leena J*  
BoS Chairman/HoD



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24CS3351

### DIGITAL PRINCIPLES AND SYSTEM DESIGN

L T P C  
3 0 2 4

#### COURSE OBJECTIVES:

1. To understand and apply the fundamentals of number systems, Boolean algebra, and logic gates in the design of digital circuits.
2. To analyze and design combinational and sequential logic circuits, including adders, multiplexers, flip-flops, counters, and state machines using simplification techniques and HDL modeling.
3. To explore memory devices and implement programmable logic using PLA, PAL, and FPGA, including error detection and correction mechanisms.

#### UNIT - I

#### BOOLEAN ALGEBRA AND LOGIC GATES

9

Number Systems — Arithmetic Operations — Binary Codes- Boolean Algebra and Logic Gates — Theorems and Properties of Boolean Algebra — Boolean Functions — Canonical and Standard Forms — Simplification of Boolean Functions using Karnaugh Map — Logic Gates — NAND and NOR Implementations.

#### UNIT - II

#### COMBINATIONAL LOGIC

9

Combinational Circuits — Analysis and Design Procedures — Binary Adder-Subtractor — Decimal Adder — Binary Multiplier — Magnitude Comparator — Decoders — Encoders — Multiplexers — Introduction to HDL Models of Combinational circuits.

#### UNIT - III

#### SYNCHRONOUS SEQUENTIAL LOGIC

9

Sequential Circuits — Storage Elements: Flip-Flops — Analysis of Clocked Sequential Circuits — State Reduction— Design Procedure — Registers and Counters — Introduction to HDL Models of Sequential Circuits.

#### UNIT - IV

#### ASYNCHRONOUS SEQUENTIAL LOGIC

9

Differentiation of synchronous and Asynchronous Sequential Circuits — Analysis of Asynchronous Sequential Circuits — Design of Asynchronous Sequential Circuits — Reduction of State and Flow Tables — Cycles and Races — Hazards.

#### UNIT - V

#### MEMORY AND PROGRAMMABLE LOGIC

9

RAM — Memory Decoding — Error Detection and Correction — ROM — Programmable Logic Array — Programmable Array Logic — Programmable Logic Devices—FPGAs.

**TOTAL: 45 PERIODS**

#### PRACTICAL EXERCISES:

#### LIST OF EXPERIMENTS

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions.
3. Implementation of 4-bit binary adder/subtractor circuits.
4. Implementation of code converters.
5. Implementation of encoder and decoder circuits.
6. Implementation of functions using Multiplexer and De-Multiplexer.
7. Implementation of the synchronous counters.
8. Implementation of Shift Register.



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9. Study of combinational and sequential circuits using HDL Coding.

**TOTAL: 30 PERIODS**

**TOTAL: 45+30=75 PERIODS**

### COURSE OUTCOMES:

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

- CO1 Apply Boolean algebra, logic gate functions, and Karnaugh Map techniques to simplify and implement combinational logic circuits.
- CO2 Analyse and design complex combinational and synchronous sequential circuits such as adders, encoders, counters, and shift registers using standard design methods and HDL modeling.
- CO3 Evaluate asynchronous sequential circuits for stability by detecting and resolving race conditions, cycles, and hazards through flow table reduction and logic optimization.
- CO4 Design and implement memory interfacing, error detection/correction logic, and programmable logic devices such as PLA, PAL, and FPGAs to solve real-world digital system problems.
- CO5 Analyze and construct both combinational and sequential circuits using HDL, and implement them on simulation platforms or programmable devices like FPGAs and PLAs.

### TEXT BOOKS:

1. "Digital Design with an Introduction to the Verilog", HDL, Pearson Education, 5<sup>th</sup> Edition M. Morris Mano and Michael D. Ciletti.
2. "Fundamentals of Digital Circuits", PHI Learning, 4<sup>th</sup> Edition, A. Anand Kumar.
3. "Digital Fundamentals", Pearson Education, 11<sup>th</sup> Edition, Thomas L. Floyd

### REFERENCES:

1. "Digital Design: Principles and Practices", Pearson Education, 4<sup>th</sup> Edition, John F. Wakerly
2. "Fundamentals of Logic Design", Cengage Learning, 7<sup>th</sup> Edition Charles H. Roth Jr. and Larry L. Kinney,
3. "Digital Electronics: A Practical Approach with VHDL", Pearson, 9<sup>th</sup> Edition, William Kleitz,
4. "Digital Principles and Design", McGraw Hill, 1<sup>st</sup> Edition Donald D. Givone.

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO 1	3	2	2	1								1	2
CO 2	3	2	3	1								1	
CO 3	2	3	2	1								1	1
CO 4				3	3	2	2	2	2	1	1	1	
CO 5				3	3	3	2	3	3	2	2	1	

Low (1) ; Medium (2) ; High (3)

*[Signature]*  
COURSE COORDINATOR

*[Signature]*  
BoS CHAIRMAN / HoD



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24AD3351	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	2	4

### COURSE OBJECTIVES:

1. To critically analyze the efficiency of alternative algorithmic solutions for the same problem
2. To illustrate brute force and divide and conquer design techniques.
3. To explain dynamic programming and greedy techniques for solving various problems.
4. To apply iterative improvement technique to solve optimization problems
5. To examine the limitations of algorithmic power and handling it in different problems.

**UNIT - I** **INTRODUCTION** **8**  
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework - Asymptotic Notations and their properties – Empirical analysis - Mathematical analysis of Recursive and Non-recursive algorithms – Visualization

**UNIT - II** **BRUTE FORCE AND DIVIDE AND CONQUER** **10**  
Brute Force – String Matching - Exhaustive Search - Traveling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Multiplication of Large Integers and Strassen’s Matrix Multiplication – Closest-Pair and Convex - Hull Problems. Decrease and Conquer: - Topological Sorting – Transform and Conquer: Presorting – Heaps and Heap Sort

**UNIT - III** **DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE** **10**  
Dynamic programming – Principle of optimality - Coin changing problem – Warshall’s and Floyd’s algorithms – Optimal Binary Search Trees - Multi stage graph - Knapsack Problem and Memory functions. Greedy Technique – Dijkstra’s algorithm - Huffman Trees and codes - 0/1 Knapsack problem

**UNIT - IV** **ITERATIVE IMPROVEMENT** **8**  
The Simplex Method-The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs-The Stable marriage Problem.

**UNIT - V** **LIMITATIONS OF ALGORITHM POWER** **9**  
Lower - Bound Arguments - P, NP, NP- Complete and NP Hard Problems. Backtracking – N-Queen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Traveling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Traveling Salesman problem – Knapsack problem.

**TOTAL: 45 PERIODS**

### PRACTICAL EXERCISES:



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1. Implement recursive and non-recursive algorithms and study the order of growth from  $\log_2 n$  to  $n!$ .
2. Divide and Conquer - Strassen's Matrix Multiplication
3. Decrease and Conquer - Topological Sorting
4. Transform and Conquer - Heap Sort
5. Dynamic programming - Coin change Problem, Warshall's and Floyd's algorithms, Knapsack Problem
6. Greedy Technique – Dijkstra's algorithm, Huffman Trees and codes
7. Iterative improvement - Simplex Method
8. Backtracking – N-Queen problem, Subset Sum Problem
9. Branch and Bound - Assignment problem, Traveling Salesman Problem.

**PRATICALS: 30 PERIODS**

**TOTAL : 45+30 = 75 PERIODS**

### COURSE OUTCOMES:

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

- CO1 Analyze the efficiency of recursive and non-recursive algorithms mathematically
- CO2 Analyze the efficiency of brute force, divide and conquer, decrease and conquer, Transform and conquer algorithmic techniques
- CO3 Implement and analyze the problems using dynamic programming and greedy algorithmic techniques
- CO4 Solve the problems using iterative improvement techniques for optimization.
- CO5 Compute the limitations of algorithmic power and solve the problems using backtracking and branch and bound techniques.

### TEXT BOOKS:

1. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Third Edition, Pearson Education, 2012.

### REFERENCES:

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

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	3	3	1	1			1	1	2	2	3	2
2	2	1	1	3	2			2	2	1	2	2	2
3	3	2	1	2	2			2	1	1	2	1	3
4	3	2	3	2	2			3	3	3	2	2	1



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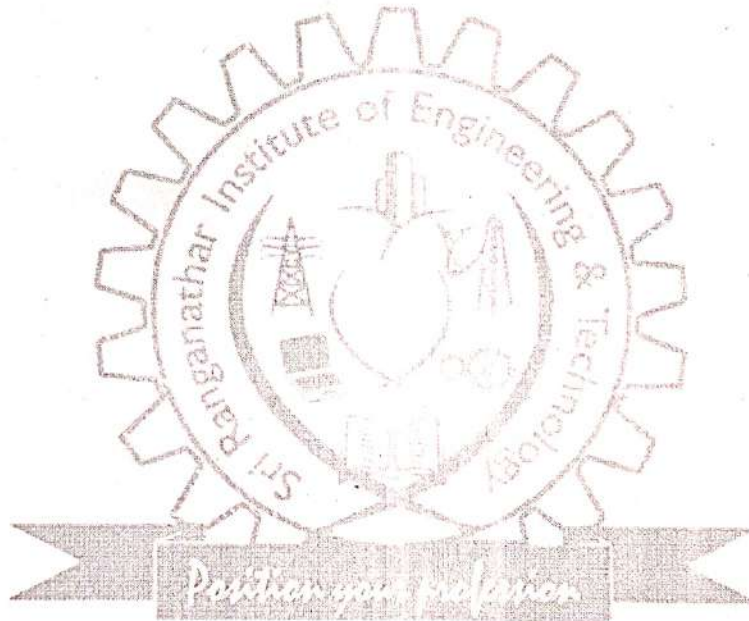


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5	3	1	2	3	3			2	2	2	2	3	1
Low (1) ; Medium (2) ; High (3)													

*malles*  
 Course Coordinator

*Leny 78.9*  
 BOS Chairman/HOD





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24AD3301

### DATA EXPLORATION AND VISUALIZATION

L	T	P	C
3	0	2	4

#### COURSE OBJECTIVES:

1. To outline an overview of exploratory data analysis.
2. To implement data visualization using Matplotlib
3. To perform univariate data exploration and analysis.
4. To apply bivariate data exploration and analysis.
5. To use Data exploration and visualization techniques for multivariate and time series data.

<b>UNIT – I</b>	<b>EXPLORATORY DATA ANALYSIS</b>	<b>9</b>
EDA fundamentals – Understanding data science – Significance of EDA – Making sense of data – Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids for EDA Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques - Grouping Datasets - data aggregation – Pivot tables and cross-tabulations.		
<b>UNIT – II</b>	<b>VISUALIZING USING MATPLOTLIB</b>	<b>9</b>
Importing Matplotlib – Simple line plots – Simple scatter plots – visualizing errors – density and contour plots – Histograms – legends – colours – subplots – text and annotation – customization – three dimensional plotting - Geographic Data with Basemap - Visualization with Seaborn.		
<b>UNIT – III</b>	<b>UNIVARIATE ANALYSIS</b>	<b>9</b>
Introduction to Single variable: Distributions and Variables - Numerical Summaries of Level and Spread - Scaling and Standardizing – Inequality - Smoothing Time Series.		
<b>UNIT – IV</b>	<b>BIVARIATE ANALYSIS</b>	<b>9</b>
Relationships between Two Variables - Percentage Tables - Analysing Contingency Tables - Handling Several Batches - Scatterplots and Resistant Lines – Transformations.		
<b>UNIT – V</b>	<b>MULTIVARIATE AND TIME SERIES ANALYSIS</b>	<b>9</b>
Introducing a Third Variable - Causal Explanations - Three-Variable Contingency Tables and Beyond - Longitudinal Data – Fundamentals of TSA – Characteristics of time series data – Data Cleaning – Time-based indexing – Visualizing – Grouping – Resampling.		
<b>TOTAL: 45 PERIODS</b>		

#### PRACTICAL EXERCISES:

1. Install the data Analysis and Visualization tool: R/ Python /Tableau Public/ Power BI.
2. Perform exploratory data analysis (EDA) on with datasets like email data set. Export all your emails as a dataset, import them inside a pandas data frame, visualize them and get different insights from the data.
3. Working with Numpy arrays, Pandas data frames, Basic plots using Matplotlib.
4. Explore various variable and row filters in R for cleaning data. Apply various plot features in R on sample data sets and visualize.
5. Perform Time Series Analysis and apply the various visualization techniques.
6. Perform Data Analysis and representation on a Map using various Map data sets with Mouse Rollover effect, user interaction, etc.



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7. Build cartographic visualization for multiple datasets involving various countries of the world; states and districts in India etc.
8. Perform EDA on Wine Quality Data Set.
9. Use a case study on a data set and apply the various EDA and visualization techniques and present an analysis report.

**PRATICALS: 30 PERIODS**  
**TOTAL : 45+30 = 75 PERIODS**

### COURSE OUTCOMES:

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

- CO1 Understand the fundamentals of exploratory data analysis.
- CO2 Implement the data visualization using Matplotlib.
- CO3 Perform univariate data exploration and analysis.
- CO4 Apply bivariate data exploration and analysis.
- CO5 Use Data exploration and visualization techniques for multivariate and time series data.

### TEXT BOOKS:

1. Suresh Kumar Mukhiya, Usman Ahmed, "Hands-On Exploratory Data Analysis with Python", Packt Publishing, 2020. (Unit 1)
2. Jake Vander Plas, "Python Data Science Handbook: Essential Tools for Working with Data", Oreilly, 1st Edition, 2016. (Unit 2)
3. Catherine Marsh, Jane Elliott, "Exploring Data: An Introduction to Data Analysis for Social Scientists", Wiley Publications, 2nd Edition, 2008. (Unit 3,4,5)

### REFERENCES:

1. Eric Pimpler, Data Visualization and Exploration with R, GeoSpatial Training service, 2017.
2. Claus O. Wilke, "Fundamentals of Data Visualization", O'reilly publications, 2019.
3. Matthew O. Ward, Georges Grinstein, Daniel Keim, "Interactive Data Visualization: Foundations, Techniques, and Applications", 2nd Edition, CRC press, 2015.

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	1	3	3				2	3	3	3	2	2
2	2	2	2	1	1			3	2	3	1	3	1
3	2	1	2	1	1			3	2	1	2	2	2
4	2	2	2	1	-			1	2	1	3	1	3
5	3	1	1	2	1			3	2	1	2	2	2

Low (1) ; Medium (2) ; High (3)

  
Course Coordinator

  
BoS Chairman/HoD



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24AD3311

ARTIFICIAL INTELLIGENCE LABORATORY

L T P C  
0 0 3 1.5

### COURSE OBJECTIVES:

1. To design and implement search strategies
2. To implement game playing techniques
3. To implement CSP techniques
4. To develop systems with logical reasoning
5. To develop systems with probabilistic reasoning

### PRACTICAL EXERCISES:

1. Implement basic search strategies – 8-Puzzle, 8 - Queens problem, Cryptarithmic.
2. Implement A\* and memory bounded A\* algorithms
3. Implement Minimax algorithm for game playing (Alpha-Beta pruning)
4. Solve constraint satisfaction problems
5. Implement propositional model checking algorithms
6. Implement forward chaining, backward chaining, and resolution strategies
7. Build naïve Bayes models
8. Implement Bayesian networks and perform inferences
9. Mini-Project

### COURSE OUTCOMES:

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

- CO1 Design and implement search strategies  
CO2 Implement game playing and CSP techniques  
CO3 Develop logical reasoning systems  
CO4 Develop probabilistic reasoning systems  
CO5 Learn techniques for reasoning under uncertainty

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	2	1	3	3				1	1	2	1	3	2
2	1	2	3	3	2			3	2	3	3	3	3
3	3	1	3	3	1			1	3	1	2	1	1
4	2	1	1	3	1			2	3	1	2	2	2
5	3	1	1	1	1			1	3	3	3	3	3

Low (1) ; Medium (2) ; High (3)

A-dap  
Course Coordinator

Langa P  
BoS Chairman/HoI



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24ME3495

### FUNDAMENTALS OF PROGRAMMING LABORATORY

L	T	P	C
0	0	3	1.5

#### COURSE OBJECTIVES:

1. To familiarise with C programming constructs.
2. To develop programs in C using basic constructs.
3. To develop programs in C using arrays.
4. To develop applications in C using strings, pointers, functions.
5. To develop applications in C using structures.
6. To develop applications in C using file processing.

#### LIST OF EXPERIMENTS:

**Note:** The lab instructor is expected to design problems based on the topics listed. The Examination shall not be restricted to the sample experiments designed.

1. Basic Introduction to C program and turbo C setup(Compile/Run program)
2. Simple program using scanf/printf
3. Program using operators(++/--,%&,|,etc) and expressions
4. Programs of loops(for, while, do while)
5. Decision-making constructs: if-else, goto, switch-case, break-continue
6. Simple program of one-Dimensional array and 2D, multi-dimensional arrays
7. Strings: operations
8. Functions: call, return, passing parameters by (value, reference), passing arrays to function
9. Program to find a factorial of a given number using recursion
10. Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointer0073
11. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions
12. Files: reading and writing, File pointers, file operations, random access, processor directives.

**TOTAL: 45 PERIODS**

#### COURSE OUTCOMES:

**At the end of the course the students will be able to**

- CO1** Develop simple applications in C using basic constructs.
- CO2** Make use of Arrays, strings, functions and recursion concepts in C for solving problems.
- CO3** Apply structures and pointers concepts in C for a given application.
- CO4** Develop application using sequential and random-access file processing techniques.
- CO5** Develop an application using the core concepts in C.

#### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	2	2	2	1			2	2	2		3	2
2	3	2	2	2	1			2	2	2		3	2
3	3	2	2	2	1			2	2	2		3	2
4	3	2	2	2	1			2	2	2		3	2



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5	3	2	2	2	1			2	2	2		3	2
Low (1) ; Medium (2) ; High (3)													

*J. Jamil*  
 Course Coordinator

*[Signature]*  
 BoS Chairman/HoD





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24GE3361

### ADVANCED LOGICAL THINKING

L	T	P	C
0	0	2	1

#### COURSE DESCRIPTION:

This course aims to develop student's logical thinking skills to an advanced level. Students will explore various techniques and strategies to analyse, evaluate, and synthesize information effectively. Analyzing a situation or problem using a logical approach involves gathering all available information, assessing the facts and efficiently deciding the best course of action. Students strive to understand various topics deeply, enhance their memory skills and build greater understanding. They also apply their ideas effectively and thoroughly analyze any arising issues.

#### COURSE OBJECTIVES:

1. Enhance Critical thinking skills by solving programming logic problems involving permutation and combinations.
2. Enhance the Decision making skills using different Possibilities through Probability
3. To develop the skills to analyze complex problems in Simple Solutions through Time Speed distance Concept.
4. Enhance the strategic thinking for Solving Real life problems using Mathematical Concepts.
5. Reinforce the Logical skills through Reasoning Puzzles.

#### UNIT – I      **INDUCTIVE REASONING THROUGH PERMUTATIONS & COMBINATION**      **6**

Fundamental Principles of Counting: Permutations & Combination, Number Generation Fundamentals; Digit repeater concepts: All possible ways; Recursion and Backtracking: N step Problems, Chess oriented problems and Case Studies.

#### UNIT – II      **DECISION MAKING BASED ON PROBABILITY**      **6**

Introduction to Probabilities, Application of Probability; Power of Compounding; Case Studies.

#### UNIT – III      **STRATEGICAL TECHNIQUES IN TIME, SPEED AND DISTANCE**      **6**

Definition and Basics of Time, Speed and Distance; Relative speed: Problems based on T rains; Effective Speed: Problems based on Boats and Streams; Problems based on Races, Escalator problems; Case Studies.

#### UNIT – IV      **THE LOGICAL APPROACH TO MIXTURE AND ALLEGATION**      **6**

Introduction to Mixtures: Multi variable mixing, Profit and Loss concept based on mixing; Liquid mixing concepts: Replacement problems and Repetitive iteration problems.

#### UNIT – V      **LOGICAL REASONING**      **6**

Introduction to design of clocks; Formula creation: Speed clock and Slow clock problems; Angle calculation; Calendars design: Concept of odd days, Day of a date and Calendar repetition logic; Data Arrangements; Data Sufficiency; Directions; Number series and Puzzles.

**TOTAL:30 PERIODS**



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## REFERENCES:

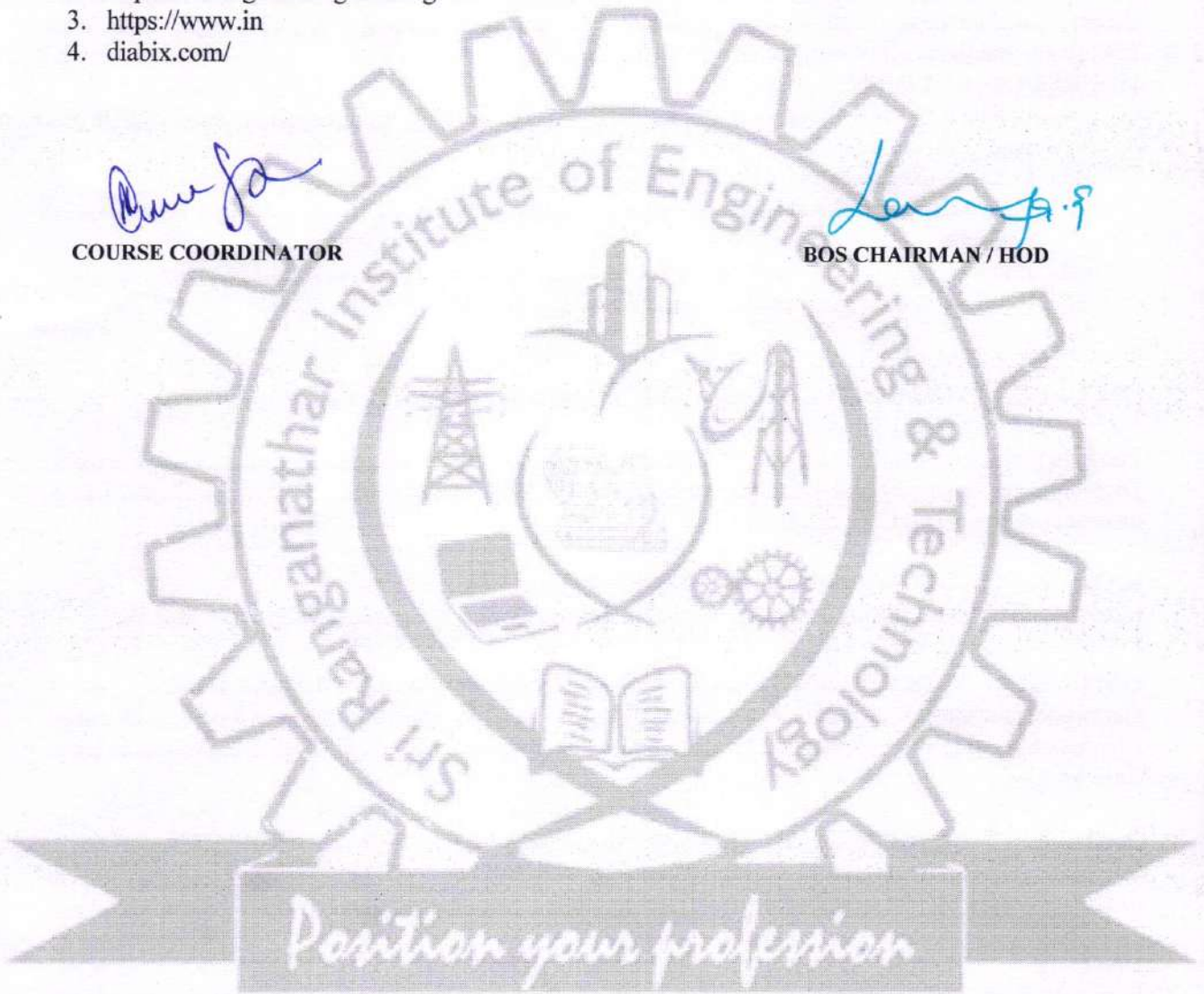
1. Dr. R S Aggarwal, Quantitative Aptitude, Revised Edition, S.Chand Publishing Company Ltd(s), 2022
2. Arun Sharma, How to prepare for Quantitative Aptitude for the CAT, 10th Edition, Tata McGraw-Hill Publishing Company Ltd, 2022.

## WEB REFERENCES:

1. <https://www.hackerearth.com/>
2. <https://www.geeksforgeeks.org/>
3. <https://www.in>
4. [diabix.com/](https://www.diabix.com/)

**COURSE COORDINATOR**

**BOS CHAIRMAN / HOD**





24MA3054

DISCRETE MATHEMATICS

L	T	P	C
3	1	0	4

**COURSE OBJECTIVES:**

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

**UNIT I LOGIC AND PROOFS**

9+3

Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

**UNIT – II COMBINATORICS**

9+3

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

**UNIT – III GRAPHS**

9+3

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

**UNIT – IV ALGEBRAIC STRUCTURES**

9+3

Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.

**UNIT – V LATTICES AND BOOLEAN ALGEBRA**

9+3

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

**TOTAL: 45+15 PERIODS**

**COURSE OUTCOMES:**

**At the end of the course the students will be able to**

- CO1 Understand program logic and testing concepts.
- CO2 Apply counting principles.
- CO3 Recognize functions mapping finite sets in computer science.
- CO4 Identify structures at multiple levels.
- CO5 Understand algebraic structures like groups, rings, and fields.



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**TEXT BOOKS:**

1. Rosen. K.H., "Discrete Mathematics and its Applications", 7<sup>th</sup> Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2017.
2. Tremblay. J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30<sup>th</sup> Reprint, 2011.

**REFERENCES:**

1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5<sup>th</sup> Edition, Pearson Education Asia, Delhi, 2013.
2. Koshy. T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.
3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3<sup>rd</sup> Edition, 2010.

**CO's-PO's & PSO's MAPPING**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	3	2								2		
2	3	3											
3		3	2			2			3				
4		2	2	2									
5		2	2	2					2				
<b>Low (1) ; Medium (2) ; High (3)</b>													

*K. K. K.*

Course Coordinator

*B. S.*

BOS Chairman/ HoD(S&H)





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### COURSE OUTCOMES:

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

- CO1 Explain the basic concepts of machine learning.
- CO2 Construct supervised learning models.
- CO3 Construct unsupervised learning algorithms.
- CO4 Evaluate and compare different models
- CO5 Evaluate interpret statistical tests for model comparison and hypothesis validation

### TEXT BOOKS:

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

### REFERENCES:

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.
2. Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997.
3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, "Foundations of Machine Learning", Second Edition, MIT Press, 2012, 2018.
4. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016
5. Sebastain Raschka, Vahid Mirjalili, "Python Machine Learning", Packt publishing, 3rd Edition, 2019.

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	2	1	2	1				3	3	2	2	2	2
2	1	3	3	1	2			2	2	2	1	3	1
3	2	1	3	3	2			1	1	1	1	1	2
4	2	3	3	2	1			3	2	3	2	1	2
5	1	1	3	3	1			3	1	1	3	3	3

Low (1) ; Medium (2) ; High (3)

A. Raj  
Course Coordinator

Levy J. S  
BoS Chairman/HoD



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<b>24AD3391</b>	<b>DATABASE DESIGN AND MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		3	0	0	3

**COURSE OBJECTIVES:**

1. To introduce database development life cycle and conceptual modeling
2. To learn SQL for data definition, manipulation and querying a database
3. To learn relational database design using conceptual mapping and normalization
4. To learn transaction concepts and serializability of schedules
5. To learn data model and querying in object-relational and No-SQL databases

<b>UNIT – I</b>	<b>CONCEPTUAL DATA MODELING</b>	<b>8</b>
Database environment – Database system development lifecycle – Requirements collection – Database design -- Entity-Relationship model – Enhanced-ER model – UML class diagrams.		
<b>UNIT – II</b>	<b>RELATIONAL MODEL AND SQL</b>	<b>10</b>
Relational model concepts -- Integrity constraints -- SQL Data manipulation – SQL Data definition – Views -- SQL programming.		
<b>UNIT – III</b>	<b>RELATIONAL DATABASE DESIGN AND NORMALIZATION</b>	<b>10</b>
ER and EER-to-Relational mapping – Update anomalies – Functional dependencies – Inference rules – Minimal cover – Properties of relational decomposition – Normalization (upto BCNF).		
<b>UNIT – IV</b>	<b>TRANSACTION MANAGEMENT</b>	<b>8</b>
Transaction concepts – properties – Schedules – Serializability – Concurrency Control – Two-phase locking techniques.		
<b>UNIT – V</b>	<b>OBJECT RELATIONAL AND NO-SQL DATABASES</b>	<b>9</b>
Mapping EER to ODB schema – Object identifier – reference types – rowtypes – UDTs – Subtypes and supertypes – user-defined routines – Collection types – Object Query Language; No-SQL: CAP theorem – Document-based: MongoDB data model and CRUD operations; Column-based: Hbase data model and CRUD operations.		
<b>TOTAL:</b>		<b>45 PERIODS</b>

**COURSE OUTCOMES:**

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

- CO1** Understand the database development life cycle and apply conceptual modelling.
- CO2** Apply SQL and programming in SQL to create, manipulate and query the database.
- CO3** Apply the conceptual-to-relational mapping and normalization to design relational database.
- CO4** Determine the serializability of any non-serial schedule using concurrency techniques.
- CO5** Apply the data model and querying in Object-relational and No-SQL databases.

**TEXT BOOKS:**



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1. Thomas M.Connolly, Carolyn E. Begg, Database Systems – A Practical Approach to Design, Implementation, and Management, Sixth Edition, Global Edition, Pearson Education, 2015.
2. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 7th Edition, Pearson, 2017.

### REFERENCES:

1. Abraham Silberschatz, Henry F Korth, S Sudharshan, "Database System Concepts", 6th Edition, Tata Mc Graw Hill, 2011.
2. Hector Garcia-Molina, Jeffrey D Ullman, Jennifer Widom, "Database Systems: The Complete Book", 2nd edition, Pearson.
3. Raghu Ramakrishnan, "Database Management Systems", 4th Edition, Tata Mc Graw Hill, 2010.
4. Toby Teorey, Sam Lightstone, Tom Nadeau, H. V. Jagadish, "DATABASE MODELING AND DESIGN - Logical Design", Fifth Edition, Morgan Kaufmann Publishers, 2011.
5. Carlos Coronel, Steven Morris, and Peter Rob, Database Systems: Design, Implementation, and Management, Ninth Edition, Cengage learning, 2012.

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	2	2	3	3				3	1	2	1	2	3
2	2	3	1	3	1			1	2	2	1	3	3
3	2	2	2	1	1			2	3	1	2	1	1
4	2	2	3	1				1	2	1	2	2	2
5	3	1	3	2	1			1	3	1	1	2	1

Low (1) ; Medium (2) ; High (3)



*M. S. Kumar*  
Course Coordinator

*L. S. P. S.*  
BoS Chairman/HoD



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24GE3451

### ENVIRONMENTAL SCIENCE AND SUSTAINABILITY

L	T	P	C
2	0	0	2

**COURSE OBJECTIVES:**

1. To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
2. To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
3. To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
4. To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes.
5. To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

**UNIT I ENVIRONMENT AND BIODIVERSITY 6**

Definition, scope and importance of environment-need for public awareness. Eco-system and Energy flow-Types of biodiversity: genetic, species and ecosystem diversity-values of biodiversity, India as a mega-diversity nation-hot-spots of biodiversity-threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts -conservation of biodiversity: In-situ and ex-situ.

**UNIT – II ENVIRONMENTAL POLLUTION 6**

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid and E-Waste management. Case studies on Occupational Health and Safety Management system (OHSMS). Environmental protection, Environmental protection acts.

**UNIT – III RENEWABLE SOURCES OF ENERGY 6**

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of-Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

**UNIT – IV SUSTAINABILITY AND MANAGEMENT 6**

Development, GDP ,Sustainability-concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change-Global, Regional and local environmental issues and possible solutions-case studies.

**UNIT – V SUSTAINABILITY PRACTICES 6**

Zero waste and R concept, Circular economies ISO:14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Green Engineering: Sustainable urbanization.

**TOTAL: 30 PERIODS**

**COURSE OUTCOMES:**

**At the end of the course the students will be able to**

- CO1 To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
- CO2 To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
- CO3 To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.



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- CO4** To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
- CO5** To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

### TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

### REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38. Edition 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.
6. S.Pream Kumar, K.Vijay Sankar, A. Suresh Kumar, M.Priyanka, "Environmental Science and Sustainability", Charulatha Publications.2025

### COs' - PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	2	2	2	2	2	2	1	2	1		1	2	1
2	2	2	2	2	2	2	1	2	1		1	2	1
3	2	2	2	2	2	2	1	2	1	1	2	2	1
4	2	2	2	2	2	2	1	2	1	2	2	2	1
5	2	2	2	2	2	2	1	2	1	1	2	2	1

Low (1) ; Medium (2) ; High (3)

  
COURSE COORDINATOR

  
BOS CHAIRMAN

<b>PERSONALITY DEVELOPMENT</b>		<b>9</b>
PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3
<b>LEADERSHIP</b>		<b>7</b>
L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7
<b>DISASTER MANAGEMENT</b>		<b>13</b>
DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1
<b>ENVIRONMENTAL AWARENESS &amp; CONSERVATION</b>		<b>3</b>
EA 1	Environmental Awareness and Conservation	3
<b>GENERAL AWARENESS</b>		<b>4</b>
GA 1	General Knowledge	4
<b>ARMED FORCES</b>		<b>6</b>
AF 1	Armed Forces, Army, CAPF, Police	6
<b>ADVENTURE</b>		<b>1</b>
AD 1	Introduction to Adventure Activities	1
<b>BORDER &amp; COASTAL AREAS</b>		<b>2</b>
BCA 1	History, Geography & Topography of Border/Coastal areas	2

**TOTAL: 45 PERIODS**

  
**COURSE COORDINATOR**

  
**BOS CHAIRMAN**

**NCC Credit Course Level 2\***

**24NX3452**

**(NAVAL WING) NCC Credit Course Level - II**

**L T P C  
3 0 0 3**

**PERSONALITY DEVELOPMENT**

PD 3	Group Discussion: Change your mindset, Time Management, Social Skills	6
PD 5	Public Speaking	3

**LEADERSHIP**

L 2	Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965	7
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**DISASTER MANAGEMENT**

DM 1	Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation	3
DM 2	Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters	9
DM 3	Fire Service & Fire Fighting	1

**ENVIRONMENTAL AWARENESS & CONSERVATION**

EA 1	Environmental Awareness and Conservation	3
------	--	---

**GENERAL AWARENESS**

GA 1	General Knowledge	4
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**NAVAL ORIENTATION**

AF 1	Armed Forces and Navy Capsule	3
EEZ 1	EEZ Maritime Security and ICG	3


**ADVENTURE**

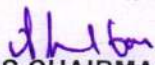
AD 1	Introduction to Adventure Activities	1
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**BORDER & COASTAL AREAS**

BCA 1	History, Geography & Topography of Border/Coastal areas	2
-------	---	---

**TOTAL: 45 PERIODS**

  
**COURSE COORDINATOR**

  
**BOS CHAIRMAN**

NCC Credit Course Level 2\*

24NX3453

(AIR FORCE WING) NCC Credit Course Level - II

L T P C

3 0 0 3

**PERSONALITY DEVELOPMENT**

9

PD 3 Group Discussion: Change your mindset, Time Management, Social Skills

6

PD 5 Public Speaking

3

**LEADERSHIP**

7

L 2 Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965

7

**DISASTER MANAGEMENT**

13

DM 1 Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation

3

DM 2 Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters

9

DM 3 Fire Service & Fire Fighting

1

**ENVIRONMENTAL AWARENESS & CONSERVATION**

3

EA 1 Environmental Awareness and Conservation

3

**GENERAL AWARENESS**

4

GA 1 General Knowledge

4

**GENERAL SERVICE KNOWLEDGE**

6

GSK 1 Armed Forces & IAF Capsule

2

GSK 2 Modes of Entry in IAF, Civil Aviation

2

GSK 3 Aircrafts - Types, Capabilities & Role

2

**ADVENTURE**

1

AD 1 Introduction to Adventure Activities

1

**BORDER & COASTAL AREAS**

2


BCA 1 History, Geography & Topography of Border/Coastal areas

2

TOTAL: 45 PERIODS



COURSE COORDINATOR



BOS CHAIRMAN



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24CS3591

### COMPUTER NETWORKS

L	T	P	C
3	0	2	4

**COURSE OBJECTIVES:**

1. To understand the concept of layering in networks.
2. To know the functions of protocols of each layer of TCP/IP protocol suite.
3. To visualize the end-to-end flow of information.
4. To learn the functions of network layer and the various routing protocols
5. To familiarize the functions and protocols of the Transport layer

<b>UNIT – I</b>	<b>INTRODUCTION AND APPLICATION LAYER</b>	<b>10</b>
Data Communication - Networks - Network Types - Protocol Layering - TCP/IP Protocol suite – OSI Model – Introduction to Sockets - Application Layer protocols: HTTP - FTP – Email protocols (SMTP - POP3 - IMAP - MIME) - DNS - SNMP		
<b>UNIT – II</b>	<b>TRANSPORT LAYER</b>	<b>9</b>
Introduction - Transport-Layer Protocols: UDP - TCP: Connection Management - Flow control - Congestion Control - Congestion avoidance (DECbit, RED) - SCTP - Quality of Service		
<b>UNIT – III</b>	<b>NETWORK LAYER</b>	<b>7</b>
Switching : Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP, RARP, ICMP, DHCP		
<b>UNIT – IV</b>	<b>ROUTING</b>	<b>7</b>
Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF – Path-vector routing - BGP- Multicast Routing: DVMRP – PIM.		
<b>UNIT – V</b>	<b>DATA LINK AND PHYSICAL LAYERS</b>	<b>12</b>
Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols - HDLC - PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance – Transmission media- Switching - Circuit Switching.		
<b>TOTAL: 45 PERIODS</b>		

**PRACTICAL EXERCISES:**

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and trace route PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like: a) Echo client and echo server b) Chat
4. Simulation of DNS using UDP sockets.
5. Use a tool like Wireshark to capture packets and examine the packets
6. Write a code simulating ARP /RARP protocols.
7. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS. 8. Study of TCP/UDP performance using Simulation tool.
8. Simulation of Distance Vector/ Link State Routing algorithm.
9. Simulation of an error correction code (like CRC)

**PRATICALS: 30 PERIODS**  
**TOTAL : 45+30 = 75 PERIODS**



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**COURSE OUTCOMES:**

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

- CO1 Explain the basic layers and its functions in computer networks.
- CO2 Understand the basics of how data flows, from one node to another.
- CO3 Analyze routing algorithms.
- CO4 Describe protocols for various functions in the network.
- CO5 Analyze the working of various application layer protocols.

**TEXT BOOKS:**

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

**REFERENCES:**

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012.

**CO's-PO's & PSO's MAPPING**

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	1	2	3				1	1	3	1	3	2
2	3	2	1	2	2			2	2	2	1	3	2
3	2	2	3	2	1			3	3	1	2	1	1
4	1	3	1	3	1			1	2	1	1	1	3
5	3	3	1	1	2			2	2	2	2	2	2
Low (1) ; Medium (2) ; High (3)													

Course Coordinator

BoS Chairman/HoD



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24AL3452

### OPERATING SYSTEMS

L	T	P	C
3	0	2	4

**COURSE OBJECTIVES:**

1. To understand the basics and functions of operating systems.
2. To understand Processes and Threads
3. To analyze Scheduling algorithms and process synchronization.
4. To understand the concept of Deadlocks.
5. To analyze various memory management schemes.
6. To be familiar with I/O management and File systems.
7. To be familiar with the basics of virtual machines and Mobile OS like iOS and Android.

**UNIT – I**

#### INTRODUCTION

7

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

**UNIT – II**

#### PROCESS MANAGEMENT

11

Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - Multithread Models – Threading issues; Process Synchronization - The critical-section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - Monitors; Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

**UNIT – III**

#### MEMORY MANAGEMENT

10

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

**UNIT – IV**

#### STORAGE MANAGEMENT

10

Mass Storage system – Disk Structure - Disk Scheduling and Management; File-System Interface - File concept - Access methods - Directory Structure - Directory organization - File system mounting - File Sharing and Protection; File System Implementation - File System Structure - Directory implementation - Allocation Methods - Free Space Management; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem.

**UNIT – V**

#### VIRTUAL MACHINES AND MOBILE OS

7

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

**TOTAL: 45 PERIODS**



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### PRACTICAL EXERCISES:

1. Installation of Operating system : Windows/ Linux
2. Illustrate UNIX commands and Shell Programming
3. Process Management using System Calls : Fork, Exec, Getpid, Exit, Wait, Close
4. Write C programs to implement the various CPU Scheduling Algorithms
5. Illustrate the inter process communication strategy
6. Implement mutual exclusion by Semaphores
7. Write a C program to avoid Deadlock using Banker's Algorithm
8. Write a C program to Implement Deadlock Detection Algorithm
9. Write C program to implement Threading
10. Implement the paging Technique using C program
11. Write C programs to implement the following Memory Allocation Methods a. First Fit b. Worst Fit c. Best Fit
12. Write C programs to implement the various Page Replacement Algorithms
13. Write C programs to Implement the various File Organization Techniques
14. Implement the following File Allocation Strategies using C programs a. Sequential b. Indexed c. Linked
15. Write C programs for the implementation of various disk scheduling algorithms.

**PRATICALS: 30 PERIODS**  
**TOTAL : 45+30 = 75 PERIODS**

**At the end of the course the students will be able to**

- CO1** Analyse various scheduling algorithms and process synchronization.
- CO2** Explain deadlock, prevention and avoidance algorithms
- CO3** Compare and contrast various memory management schemes
- CO4** Explain the functionality of file systems I/O systems, and Virtualization
- CO5** Compare iOS and Android Operating Systems.

### TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2018.
2. Andrew S Tanenbaum, "Modern Operating Systems"; Pearson, 4th Edition, New Delhi, 2016.

### REFERENCES:

1. Ramaz Elmasri, A. Gil Carrick, David Levine, "Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010.
2. William Stallings, "Operating Systems: Internals and Design Principles", 7 th Edition, Prentice Hall, 2018.
3. Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.

### CO's-PO's & PSO's MAPPING

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	1	1	1				1	1	1	2	2	2



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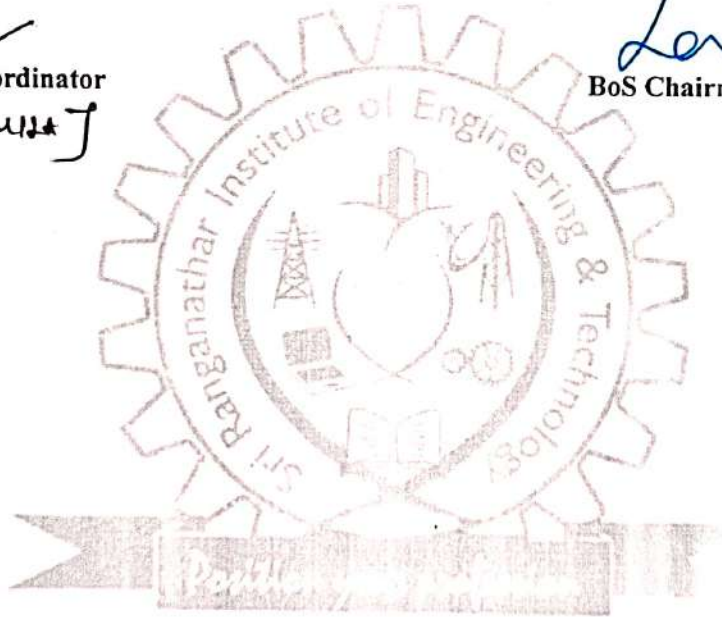


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2	2	3	1	3	1			3	2	2	3	3	3
3	2	2	3	3	2			3	1	1	2	1	1
4	2	2	1	2	1			1	3	2	1	1	1
5	2	3	3	2	1			3	1	2	1	3	1
Low (1) ; Medium (2) ; High (3)													

  
 Course Coordinator  
 [J. JAMILA]

  
 BoS Chairman/HoD





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24AD3461

MACHINE LEARNING LABORATORY

L	T	P	C
0	0	3	1.5

### COURSE OBJECTIVES:

1. To understand the data sets and apply suitable algorithms for selecting the appropriate features for analysis.
2. To learn to implement supervised machine learning algorithms on standard datasets and evaluate the performance.
3. To experiment the unsupervised machine learning algorithms on standard datasets and evaluate the performance.
4. To build the graph based learning models for standard data sets.
5. To compare the performance of different ML algorithms and select the suitable one based on the application.

### PRACTICAL EXERCISES:

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

List of Equipments: (30 Students per Batch)

The programs can be implemented in either Python or R.

**TOTAL:60 PERIODS**

### COURSE OUTCOMES:

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

- CO1 Apply suitable algorithms for selecting the appropriate features for analysis.
- CO2 Implement supervised machine learning algorithms on standard datasets and evaluate the performance.



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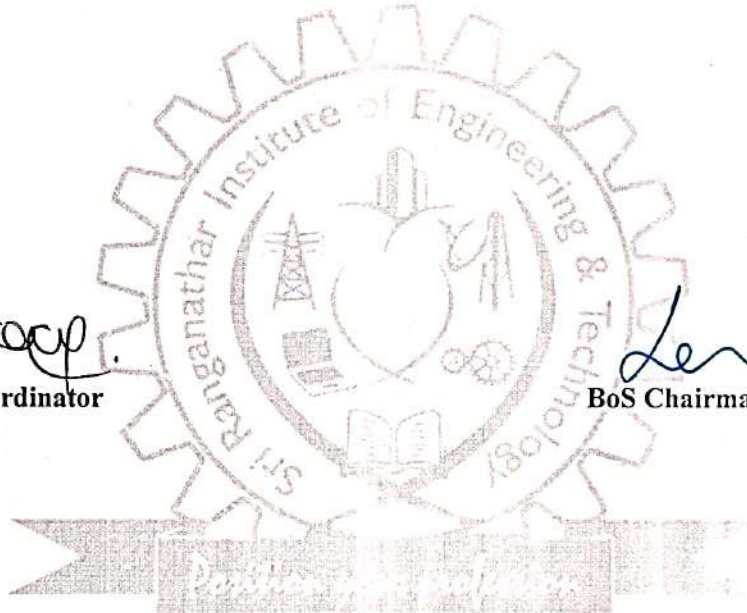
- CO3 Apply unsupervised machine learning algorithms on standard datasets and evaluate the performance.
- CO4 Build the graph based learning models for standard data sets.
- CO5 Assess and compare the performance of different ML algorithms and select the suitable one based on the application.

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	2	2	2	1				1	2	3	3	3	2
2	2	1	1	3	2			3	2	3	2	3	1
3	2	2	1	1	2			1	1	1	1	2	3
4	2	2	3	3	2			1	2	1	1	1	2
5	2	2	3	1	2			3	1	1	1	2	1

Low (1) ; Medium (2) ; High (3)

*A. R. R. R.*  
Course Coordinator

*Len J. J.*  
BoS Chairman/HoD





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24AD3381

### DATABASE DESIGN AND MANAGEMENT LABORATORY

L	T	P	C
0	0	3	1.5

**COURSE OBJECTIVES:**

1. To understand the database development life cycle.
2. To learn database design using conceptual modeling, Normalization
3. To implement database using Data definition, Querying using SQL manipulation and SQL programming
4. To implement database applications using IDE/RAD tools
5. To learn querying Object-relational databases

**PRACTICAL EXERCISES:**

1. Database Development Life cycle: Problem definition and Requirement analysis Scope and Constraints.
2. Database design using Conceptual modeling (ER-EER) – top-down approach Mapping conceptual to relational database and validate using Normalization
3. Implement the database using SQL Data definition with constraints, Views
4. Query the database using SQL Manipulation
5. Querying/Managing the database using SQL Programming - Stored Procedures/Functions - Constraints and security using Triggers
6. Database design using Normalization – bottom-up approach
7. Develop database applications using IDE/RAD tools (Eg., NetBeans, VisualStudio)
8. Database design using EER-to-ODB mapping / UML class diagrams
9. Object features of SQL-UDTs and sub-types, Tables using UDTs, Inheritance, Method definition
10. Querying the Object-relational database using Object Query language

**TOTAL : 45 PERIODS**

**COURSE OUTCOMES**

**At the end of the course the students will be able to**

- CO1** Understand the database development life cycle
- CO2** Design relational database using conceptual-to-relational mapping, Normalization
- CO3** Apply SQL for creation, manipulation and retrieval of data
- CO4** Develop a database applications for real-time problems
- CO5** Design and query object-relational databases

**HARDWARE :** • Standalone Desktops

**SOFTWARE :** • PostgreSQL

CO's	PO's											PSO's	
	1	2	3	4	5	6	7	8	9	10	11	1	2
1	3	1	3	3				1	1	1	3	2	2
2	2	2	1	3	1			3	2	3	1	1	1
3	2	1	3	1				3	3	1	1	2	1
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5	3	3	1	3	1			1	3	2	3	3	3



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Low (1) ; Medium (2) ; High (3)

  
Course Coordinator

  
BoS Chairman/HoD

