

# **SRM VALLIAMMAI ENGINEERING COLLEGE**

**(AN AUTONOMOUS INSTITUTION)**

**SRM Nagar, Kattankulathur - 603 203.**

**(Approved by AICTE, Affiliated to Anna University, 'A' Grade Accredited by NAAC, NBA  
Accredited, ISO 9001: 2015 Certified)**



## **CURRICULA AND SYLLABI**

**B.E.– COMPUTER SCIENCE AND ENGINEERING**

**REGULATION 2023**

# SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution, Affiliated to Anna University, Chennai)

## B.E. COMPUTER SCIENCE AND ENGINEERING

### REGULATIONS – 2023

#### 1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

1. To mould students to exhibit top performance in the higher education and research and to become the State-of-the-art technocrat.
2. To impart the necessary background in Computer Science and Engineering by providing solid foundation in Mathematical, Science and Engineering fundamentals.
3. To equip the students with the breadth of Computer Science and Engineering innovate novel solutions for the benefit of common man.
4. To groom the students to be multifaceted entrepreneurs with professional ethical attitude in broader social perspective.
5. To provide an ambience learning environment that is conducive for the growth of successful professional career of students.

#### 2. PROGRAMME OUTCOMES (POs):

After going through the four years of study, our Electrical and Electronics Engineering Graduates will exhibit ability to:

PO#	Graduate Attribute	Programme Outcomes
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12	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

### 3. PROGRAM SPECIFIC OUTCOMES (PSOs):

By the completion of Computer Science and Engineering program the student will have following Program specific outcomes

1. Exhibit proficiency in planning, implementing and evaluating team oriented-software Programming solutions to specific business problems and society needs.
2. Demonstrate professional skills in applying programming skills, competency and decision making capability through hands-on experiences.
3. Apply logical thinking in analyzing complex real world problems, and use professional and ethical behaviors to provide proper solutions to those problems.
4. Demonstrate the ability to work effectively as part of a team in applying technology to business and personal situations.

#### 4. PEO / PO Mapping:

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAM OUTCOMES												PROGRAM SPECIFIC OUTCOMES			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
I	2	3	2		2	-	-	-	-	-	-	2	1	2	-	3
II	-	-	1	2	2	2	2	2	-	2	-	-	-	3	2	-
III	2	-	2		2	-	-	-	2	2	2	-	1	-	2	1
IV	2	2	3	2	3	3	-	-	-	-	-	1	-	2	-	1
V	-	-	-	-	-	1	2	2	-	2	-	-	-	1	2	-

**Contribution**

**1: Reasonable**

**2: Significant**

**3: Strong**

		<b>Subject code &amp; Name</b>	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
Year I	Sem I	EN3111 - Professional English – I	2.2	2.6	2.0	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-	-	
		MA3122 - Matrices and Calculus	3.0	2.0	2.0	1.0	-	-	-	-	-	-	-	-	1.0	-	-	1.0	-
		PH3123 - Engineering Physics	2.8	1.4	1.4	1.0	1.2	1.0	1.0	-	-	-	-	-	1.0	-	-	-	-
		CH3124 - Engineering Chemistry	2.8	1.8	2.2	1.5	1.0	1.0	2.0	-	-	-	-	-	2.0	-	-	-	-
		GE3131 - Basic Electrical and Electronics Engineering	2.8	1.8	2.2	1.5	1.0	1.0	2.0	-	-	-	-	-	2.0	-	-	-	-
		GE3111 - தமிழர் மரபு / Heritage of Tamils																	
		GE3121 - Physics and Chemistry Laboratory	3.0	2.4	2.6	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-	-
		GE3134 – Engineering Practices Laboratory	3.0	2.0	2.3	2.0	2.3	1.0	-	-	1.0	-	1.0	1.0	1.0	1.6	2	2.5	2
		EN3119 - English Language Learning Laboratory	1.6	1.2	1	1.3	2	-	2	-	-	-	2.8	-	1	-	-	-	-
		Year I	Sem II	EN3211 – Professional English – II	2.0	2.0	1.4	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-
MA3222 - Statistics and Numerical Methods	3.0			3.0	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-
PH3222 - Physics for Information Science	3.0			1.0	1.7	1.0	2.0	1.0	1.3	-	-	-	-	-	1.0	-	-	-	-
CH3222 - Chemistry for Information Science	1.6			1.0	1.0	2.0	2.25	-	1.0	-	-	-	-	-	1.0	2.0	-	1.0	-
GE3231 - Problem Solving and Python Programming	2.4			2.6	3.0	2.7	1.8	-	-	-	-	-	-	1.6	2.0	2.5	-	2.0	1.0
GE3211 - தமிழரும் தொழில் நுட்பமும் / Tamils and Technology																			
GE3232 – Engineering Graphics and Design	2.0			-	3.0	-	1.0	-	-	-	-	1.0	3.0	-	2.0	2.0	1.0	1.0	1.0
GE3221 - Engineering Sciences Laboratory	3.0			2.4	2.6	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-	-
GE3232 - Problem Solving and Python Programming Laboratory	2.6			2.6	3.0	2.7	2.2	-	-	-	-	-	-	2.0	2.0	1.0	3.0	1.7	2.0
GE3251 - NSS / YRC / NSO / Club Activities #																			

Year II	Sem III		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
		MA3322 - Discrete Mathematics	3.0	3.0	2.4	-	-	-	-	-	-	-	1.0	-	-	1.0	-	-	1.0
AD3363 - Digital Principles and Computer Organization	2.7	2.5	2.5	2.5	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	-	2.5	1.5	-	2.0	-	
IT3361 - Programming and Data Structures	3.0	2.8	2.6	-	-	-	-	-	-	-	-	-	-	-	3.0	2.0	-	-	
CS3361 - Object Oriented Programming	2	1.4	2.2	2	2	-	-	-	-	2.4	1.8	1.2	2.4	3	1.8	2.2	1.6		
CS3362 - Introduction to Data Science	2.2	1.8	1.2	1.6	1.8	1.0	1.0	-	-	1.2	1.2	1.2	2.2	2.2	2.4	2.0	1.6		
CS3363 - Software Engineering	2.0	2.0	3.0	3.0	-	2.5	-	-	-	-	2.0	3.0	2.0	2.0	2.0	1.5	-		
IT3363 - Programming and Data Structures Laboratory	2.6	2.3	3.0	-	2.0	-	-	-	-	-	-	-	-	3.0	2.0	-	-		
CS3364 - Object Oriented Programming Laboratory	1.8	1.8	2.0	1.6	2.0	-	-	-	-	1.6	1.8	1.6	1.8	1.6	2.0	2.0	1.6		
CS3365 - Data Science Laboratory	2.4	2.2	1.6	2.2	1.0	-	-	-	-	2.0	1.8	2.4	2.0	1.8	2.8	2.4	-		
Year II	Sem IV	MA3422 - Applied Mathematics for Information Science	3.0	3.0	3.0	-	-	-	-	-	1.0	1.0	-	1.0	-	-	1.0	-	
		CS3461 - Theory of Computation	1.8	2.2	2.4	1.8	1.0	-	-	-	1.4	2.2	2.2	2.4	1.8	2.0	2.2	-	
		CS3462 - Object Oriented Analysis and Design	1.5	2.0	2.6	3.0	2.0	3.0	3.0	-	-	2.0	-	1.5	1.0	1.5	1.0	-	
		CS3463 - Database Management Systems	2.0	1.6	2.6	2.0	1.2	-	-	-	2.0	2.0	2.2	2.0	2.0	1.8	2.6	-	
		CS3464 - Design and Analysis of Algorithms	1.4	1.8	2.4	2.2	1.6	-	-	-	1.8	2.0	2.4	2.4	2.0	1.8	2.4	-	
		IT3461 - Operating Systems	2.0	2.0	2.4	1.8	1.0	-	-	-	-	-	-	-	-	2.0	-	-	
		GE3451 -NCC Credit Course Level - I																	
		IT3464 - Operating Systems Laboratory	2.4	1.8	1.8	1.6	2	-	-	-	-	-	-	-	-	2.0	-	-	
		CS3465 - Object Oriented Analysis and Design Laboratory	2.3	2.0	1.5	2.0	1.0	2.0	2.0	2.0	2.0	1.0	3.0	2.0	2.0	3.0	2.0	2.6	2
		CS3466 – Database Management Systems Laboratory	2.4	2.6	2.4	2	1.2	-	-	-	-	1.6	1.4	2.6	2.2	2.4	1.8	2.4	-

# SRM VALLIAMMAI ENGINEERING COLLEGE

(AN AUTONOMOUS INSTITUTION)

REGULATIONS 2023

CHOICE BASED CREDIT SYSTEM

## B.E. COMPUTER SCIENCE AND ENGINEERING

CURRICULUM FOR SEMESTERS I TO IV

Semester - I								
S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	EN3111	Professional English – I	HSMC	3	3	0	0	3
2	MA3122	Matrices and Calculus	BSC	4	3	1	0	4
3	PH3123	Engineering Physics	BSC	3	3	0	0	3
4	CH3124	Engineering Chemistry	BSC	3	3	0	0	3
5	GE3131	Basic Electrical and Electronics Engineering	ESC	3	3	0	0	3
6	GE3111	தமிழர் மரபு / Heritage of Tamils	HSMC	1	1	0	0	1
<b>PRACTICAL</b>								
7	GE3121	Physics and Chemistry Laboratory	BSC	4	0	0	4	2
8	GE3134	Engineering Practices Laboratory	ESC	4	0	0	4	2
9	EN3119	English Language Learning Laboratory	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>27</b>	<b>16</b>	<b>1</b>	<b>10</b>	<b>22</b>
Semester - II								
S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	EN3211	Professional English – II	HSMC	3	3	0	0	3
2	MA3222	Statistics and Numerical Methods	BSC	4	3	1	0	4
3	PH3222	Physics for Information Science	BSC	3	3	0	0	3
4	CH3222	Chemistry for Information Science	BSC	3	3	0	0	3
5	GE3231	Problem Solving and Python Programming	ESC	3	3	0	0	3
6	GE3211	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	HSMC	1	1	0	0	1
<b>THEORY CUM PRACTICAL</b>								
7	GE3233	Engineering Graphics and Design	ESC	5	1	0	4	3
<b>PRACTICAL</b>								
8	GE3221	Engineering Sciences Laboratory	BSC	4	0	0	4	2
9	GE3232	Problem Solving and Python Programming Laboratory	ESC	4	0	0	4	2
10	GE3251	NSS / YRC / NSO / Club Activities #	PCD	0#	0	0	0	0#
<b>TOTAL</b>				<b>31</b>	<b>17</b>	<b>1</b>	<b>13</b>	<b>24</b>
<b># Conducted after college hours</b>								

Semester - III									
S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	
<b>THEORY</b>									
1	MA3322	Discrete Mathematics	BSC	3	3	0	0	3	
2	AD3363	Digital Principles and Computer Organization	PCC	3	3	0	0	3	
3	IT3361	Programming and Data Structures	PCC	3	3	0	0	3	
4	CS3361	Object Oriented Programming	PCC	3	3	0	0	3	
5	CS3362	Introduction to Data Science	PCC	3	3	0	0	3	
6	CS3363	Software Engineering	PCC	3	3	0	0	3	
<b>PRACTICAL</b>									
7	IT3363	Programming and Data Structures Laboratory	PCC	3	0	0	3	1.5	
8	CS3364	Object Oriented Programming Laboratory	PCC	3	0	0	3	1.5	
9	CS3365	Data Science Laboratory	PCC	3	0	0	3	1.5	
				<b>TOTAL</b>	<b>27</b>	<b>18</b>	<b>0</b>	<b>9</b>	<b>22.5</b>

Semester - IV									
S.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	
<b>THEORY</b>									
1	MA3422	Applied Mathematics for Electrical and Information Science	BSC	2	2	0	0	2	
2	CS3461	Theory of Computation	PCC	3	3	0	0	3	
3	CS3462	Object Oriented Analysis and Design	PCC	3	3	0	0	3	
4	CS3463	Database Management Systems	PCC	3	3	0	0	3	
5	CS3464	Design and Analysis of Algorithms	PCC	3	3	0	0	3	
6	IT3461	Operating Systems	PCC	3	3	0	0	3	
7	GE3451	NCC Credit Course Level - I*	PCD	3*	3*	0	0	3*	
<b>PRACTICAL</b>									
8	IT3464	Operating Systems Laboratory	PCC	3	0	0	3	1.5	
9	CS3465	Object Oriented Analysis and Design Laboratory	PCC	3	0	0	3	1.5	
10	CS3466	Database Management Systems Laboratory	PCC	3	0	0	3	1.5	
				<b>TOTAL</b>	<b>26</b>	<b>17</b>	<b>0</b>	<b>9</b>	<b>21.5</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.



## SUMMARY

Sl.No	Subject Area	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HSMC	4	4				2	2		12
2	BSC	12	12	3	2					29
3	ESC	5	8			2				15
4	PCC			19.5	19.5	16.5	10.5	9		75
5	PEC					6	6	6		18
6	OEC							3		3
7	EEC	1					3	1	10	15
8	PCD		0							-
9	Mandatory Course (Non-credit)						0	0		-
10	Total	22	24	22.5	21.5	24.5	21.5	21	10	167

## SEMESTER I

EN3111	PROFESSIONAL ENGLISH – I	L	T	P	C
		3	0	0	3

### COURSE OBJECTIVES

1. To upgrade the English language skills of students by introducing communication techniques, speaking and grammar learning activities which are relevant to authentic contexts.
2. To improve the basic reading and writing skills of the learners.
3. To enhance the communicative competence of the first-year engineering students.
4. To enable learners to use language effectively in academic/work contexts.
5. To help learners understand content- context in relevant situations.

### UNIT - I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 9

**Listening:** Podcast watching –Listening for new words and pronunciation.

**Speaking:** Note of appreciation for classmates /family member – formal appreciation of someone, expression of feelings.

**Reading:** Books, shorts stories to be read. Filling forms (i.e.) post office or bank.

**Writing:** Film and series Review / Book Review, Email and Informal letters.

**Language and Vocabulary development:** WH questions, Yes/No questions, Single Word Substitutes, Pronouns, Parts of Speech, Question tags, Prefixes and Suffixes.

### UNIT - II NARRATION AND SUMMATION 9

**Listening:** Books – Short Stories to be read aloud in class for listening purpose.

**Speaking:** Short stories to be read and narrated in the class.

**Reading:** Reading favourite blogs on Travel, Sports and Food and expressing opinions regarding the same.

**Writing:** Paragraph writing, Report – field trip / I.V., Autobiography and Comprehension.

**Language and Vocabulary development:** Tenses – Past, Antonyms, Synonyms, Subject Verb agreement and Prepositions.

### **UNIT - III DESCRIPTION OF A PROCESS/PRODUCT**

**9**

**Listening:** Listening to snippets from celebrities/ National leaders' lives.

**Speaking:** Narrating personal experiences/ events – Expression of emotions and feelings.

**Reading:** Reading short biographies – famous people and description of the same.

**Writing:** Instruction, Product / Process description and Advertisements (classified advertisement and display advertisement)

**Language and Vocabulary development:** Adjectives- Degrees of Comparison, Tenses – Present, Compound Nouns, Homonyms, Homophones and Discourse markers – connective and sequence words.

### **UNIT - IV CLASSIFICATION AND INTERPRETATION**

**9**

**Listening:** Listening to Ted Talks.

**Speaking:** Recreating a Ted talk session in the class.

**Reading:** Newspaper Reading (Editorial) and understanding.

**Writing:** Note making, Blogging, Interpretation of charts and graphs.

**Language and Vocabulary development:** Articles, Collocations and Phrasal Verbs.

### **UNIT - V EXPRESSION OF THOUGHTS AND IDEAS**

**9**

**Listening:** Listening to audio books and answering questions.

**Speaking:** Presentation on a non-technical topic.

**Reading:** Editorials from newspaper.

**Writing:** Essay writing – Descriptive and Narrative essays.

**Language and Vocabulary development:** Tenses – future, Negative statements and questions, Punctuations, Cause and Effect, Content and Function words.

**TOTAL: 45 PERIODS**

## **COURSE OUTCOMES**

At the end of the course, learners will be able

1. To strengthen the basics of grammar.
2. To narrate informal and informal situations.
3. To describe a process/product and express opinion.
4. To interpret and analyse the content/information given.
5. To write short essays, personal letters and emails in English.

## **TEXT BOOKS**

1. English for Science and Technology Cambridge University Press, 2021.  
Dr.Veena Selvam, Dr.Sujatha Priyadarshini, Dr. Deep Mary Francis,  
Dr.K.N.Shoba and Dr.Lourdes Jovani, Department of English, Anna University.
2. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, New Delhi, 2016.

## **REFERENCE BOOKS**

1. Effective Communication Skill, Kulbhusan Kumar, R.S.Salaria, Khanna Publishing House, January, 2016.
2. Wings of Fire - An Autobiography by A.P.J Abdul Kalam with Arun Tiwari, Sangam Books Ltd., Edition: 50, 1999.
3. World's Most Popular Short Stories Saki Maupassant, Anton Chekhov, O Henry Paperback, 2019.
4. Professional Speaking skills, Aruna Koneru, Oxford University Press, 2018.
5. English For Engineers and Technologists, Orient Blackswan Private Ltd., Department of English, Anna University, 2020.

## CO - PO and CO - PSO MAPPING

EN3111	PROGRAM OUTCOMES												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	2	2	2	-	-	-	-	3	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	3	1	1	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	3	-	1	-	-	-	-
CO4	3	3	-	2	-	-	2	-	-	3	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
CON	2.2	2.6	2.0	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-	-

**COURSE OBJECTIVES**

1. To understand and apply matrix techniques for engineering applications.
2. To familiarize the student with basic calculus and traditional calculus.
3. To solve the problems in single and multivariable calculus and plays an important role in science, economics, engineering.
4. Vector calculus can be widely used for modelling the various laws of physics.
5. To familiarize the student with multiple integrals and their usage in find the area and volume of two and three dimensional objects.

**UNIT - I MATRICES****9L+3T**

Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigen vectors - Statement and Applications of Cayley-Hamilton Theorem - Reduction of a quadratic form into canonical form by orthogonal transformation.

**UNIT - II DIFFERENTIAL CALCULUS OF ONE VARIABLE****9L+3T**

Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation- Rolle's Theorem and Mean Value theorem -Taylor's series- Maxima and Minima of functions of one variable.

**UNIT - III DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES****9L+3T**

Partial derivatives - Total derivatives - Jacobians 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 - IV MULTIPLE INTEGRALS****9L+3T**

Double integrals in Cartesian and polar coordinates - Change of order of integration - Area enclosed by plane curves - Change of variables in Polar coordinates - Triple integrals - Volume of solids.

## UNIT - V VECTOR CALCULUS

9L+3T

Gradient and directional derivative – Divergence and curl – Vector identities – Irrotational and Solenoidal vector fields – Vector Integration Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

**TOTAL: 45L +15T PERIODS**

### COURSE OUTCOMES

1. To apply the idea of reducing complex problems into simple form using matrix technique.
2. Basic application of calculus in engineering problems and to tackle for different geometries.
3. This course equips the students to have basic knowledge and understanding of the partial derivatives and maxima and minima by Lagrange's method.
4. Basic application of Double and Triple integrals used in Engineering real life problems.
5. To study Vector differentiation and vector integration by standard theorems.

### TEXT BOOKS

1. Grewal. B.S, "Higher Engineering Mathematics", 41<sup>st</sup> Edition, Khanna Publications, Delhi, 2011.
2. Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", S.Chand Co. Pvt. Ltd., 11<sup>th</sup> Edition, 2005.
3. Veerarajan.T, "Engineering Mathematics", Mc Graw Hill Education(India) Private Ltd., 2019.

### REFERENCE BOOKS

1. Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt. Ltd., 2011.
2. James Stewart, "Calculus : Early Transcendentals ", Cengage Learning, 8<sup>th</sup> Edition, New Delhi, 2015.
3. Sivarama Krishna Das P. and Rukmangadachari E., "Engineering Mathematics", Volume I, Second Edition, Pearson Publishing, 2017.
4. Glyn James, "Advanced Modern Engineering Mathematics", 3<sup>rd</sup> Edition, Pearson Education, 2012.

## CO - PO and CO - PSO MAPPING

MA3122	PROGRAM OUTCOMES												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
<b>CO1</b>	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
<b>CO2</b>	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
<b>CO3</b>	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
<b>CO4</b>	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
<b>CO5</b>	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
<b>CON</b>	<b>3.0</b>	<b>2.0</b>	<b>2.0</b>	<b>1.0</b>	-	-	-	-	-	-	-	<b>1.0</b>	-	-	<b>1.0</b>	-



**OBJECTIVES:**

- To enhance the fundamental knowledge in crystalline materials and its applications.
- To explore the knowledge in the production of ultrasonic waves and application in the engineering field.
- To familiarize the basics of laser and their technical advances in scientific, industrial and health care areas.
- To understand the principle of fibre optical fibre and its applications.
- To explore basic concept of quantum and dual nature of particle.

**UNIT-I: PROPERTIES OF MATERIALS****9**

Elasticity - Hooke's law - Stress-strain and its uses - Poisson ratio - factors affecting elastic modulus and tensile strength. Single crystalline, polycrystalline and amorphous materials - unit cell - space lattice - crystal systems - Bravais lattice - Miller indices - d-spacing - characteristics of unit cell - SC, BCC, FCC and HCP structure - thermal and mechanical properties of materials - crystal growth techniques - Czochralski and Bridgmann.

**UNIT-II: ULTRASONICS****9**

Introduction - Properties - Production: **Magnetostriction method** and **Piezoelectric method** - Acoustical grating - **determination of ultrasonic velocity in liquid** - **Application:** Detection of flaw in materials (Non Destructive Testing) - ultrasonic soldering, welding - SONAR - diagnostic sonography - cars' air bag sensor-dispersion of fog - Probe sonication for 2D material formation.

**UNIT-III: LASERS AND ITS APPLICATIONS****9**

Basic concepts and characteristics - Einstein's A and B coefficients (derivation) - population inversion - Pumping methods - Nd-YAG laser - CO<sub>2</sub> laser - Semiconductor lasers: homo junction and heterojunction - applications: laser welding, laser cutting, laser cooling, pattern formation by laser etching, laser bar code scanner - LIDAR - Laser tissue interaction, laser surgery - Holography - NLO - electro-optic effect.

#### **UNIT-IV: FIBRE OPTICS**

**9**

Structure and principle - Propagation of light through optical fibre - acceptance angle, numerical aperture - fractional index change - Types of optical fibres (material, mode and refractive index) - Attenuation: absorption, scattering and bending - Dispersion - Fibre optic communication system (Block diagram) and advantages over conventional methods - fibre optic sensors: pressure and displacement- Endoscope.

#### **UNIT-V: QUANTUM PHYSICS**

**9**

Black body radiation and energy distribution spectrum - Planck's theory of radiation - matter waves - de-Broglie wavelength in terms of energy, voltage and temperature - Electron diffraction - G.P.Thomson experiment - wave function and its physical significance - Schrödinger's wave equation - time independent and time dependent equations - Particle in a one-dimensional box- Normalization of wave function - Quantum Tunnelling - Scanning Tunnelling Microscope.

**TOTAL: 45 PERIODS**

#### **OUTCOMES:**

At the end of the course, the students should be able

- To understand the properties of materials, crystalline material and growth techniques.
- To understand the basics, generation and application of ultrasonics.
- To acquire knowledge on the concepts of lasers and their applications in industry and medical field.
- To conversant on principle behind the fibres and their applications in communication and devices made out of optical fibre.
- To get knowledge on advanced physics concepts of quantum theory and its applications.

#### **TEXT BOOKS:**

1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.
4. Brijlal and Subramanyam, "Properties of Matter", S .Chand publishing, 2002.

5. M.N.Avadhanulu & P.G.Kshirasagar, "A Text Book of Engineering Physics" – IX Edition, S.Chand Publications, 2014.
6. V.Rajendiran, Engineering Physics, Tata McGraw-Hill, New Delhi. 2011.

#### REFERENCE BOOKS:

1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3. Shatendra Sharma & Jyotsna Sharma, "Engineering Physics". Pearson, 2018.

#### CO – PO – PSO Mapping

CO'S	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	1	1	-	-	1	1	-	-	-	-	1	-	-	-	-
CO2	3	1	1	1	2	1	1	-	-	-		1	-	-	-	-
CO3	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
CO4	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
CO5	2	1	1	1	1	1	1	-	-	-	-	1	-	-	-	-
CON	2.8	1.4	1.4	1	1.25	1	1	-	-	-	-	1	-	-	-	-

**OBJECTIVES:**

- To make the students familiar with boiler feed water requirements, related problems and domestic water treatment techniques.
- To introduce the basic concepts and applications of chemical thermodynamics.
- To acquaint the student with the principles of chemical kinetics and its applications towards engineering.
- To make the student conversant with the basics of surface chemistry and catalysis.
- To inculcate the students with the basics principles and preparatory methods of nanomaterials.

**UNIT I WATER TECHNOLOGY 9**

Introduction-sources of water-impurities present in water-hard water and hardness - types, Municipal water treatment: primary treatment and disinfection - Desalination of brackish water: Reverse Osmosis, Boiler troubles: scale and sludge, caustic embrittlement, boiler corrosion priming and foaming, Treatment of boiler feed water - Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning). External treatment: Ion exchange process, cooling waters (Langelier index).

**UNIT II CHEMICAL THERMODYNAMICS 9**

Introduction-terminology of thermodynamics, the first law of thermodynamics: enthalpy, second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions: Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions, Criteria of spontaneity; Gibbs-Helmholtz equation, Clausius-Clapeyron equation, Maxwell relations, Van't Hoff isotherm and isochore.

**UNIT III CHEMICAL KINETICS 9**

Introduction-factors influencing the rate of reaction, order and molecularity of a reaction, kinetic equations of different orders (first, second and third order) - determination of the order of a reaction, the temperature dependence of reaction rates, unimolecular reactions, photochemical reactions and chain reactions, Theories of reaction rates, lasers in chemistry, fast reactions.

**UNIT IV SURFACE CHEMISTRY AND CATALYSIS 9**

Adsorption: classification - adsorption of gases on solids - adsorption from solutions - adsorption isotherms - applications of adsorption - Freundlich's adsorption isotherm - Langmuir's adsorption isotherm, B.E.T isotherm. Catalysis: introduction - types of catalysis - criteria - autocatalysis - catalytic poisoning and catalytic promoters - acid -base catalysis - enzyme catalysis - Michaelis - Menten equation.

**UNIT V NANOCHEMISTRY 9**

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties; Types of nanomaterials: Definition, properties and uses of - nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electrospinning. Applications of nanomaterials in medicine, agriculture, food science and energy resources.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

**At the end of the course, the student should be able:**

1. To infer the quality of water from quality parameter data and propose suitable treatment.
2. To apply the knowledge of chemical thermodynamics for material design and aspects
3. To recommend the proper chemical kinetics for engineering processes and applications.
4. To recognize the surface morphology and its engineering applications.
5. To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

**TEXTBOOKS:**

1. Payal B. Joshi and Shashank Deep, "Engineering Chemistry", Oxford University Press, New Delhi, 2019.
2. Shikha Agarwal, "Engineering Chemistry"-Fundamentals and Applications, 2nd Edition, Cambridge University Press, New Delhi, 2019.
3. P. C. Jain and Monica Jain, "Engineering Chemistry", 18th Edition, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2021.

**REFERENCES:**

1. R. V. Gadag and A. Nithyananda Shetty, "Engineering Chemistry", 3rd Edition, Wiley & I.K. International (P), LTD, New Delhi, 2019.
2. S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", 12th Edition, S. Chand & Company LTD, New Delhi, 2018.
3. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company LTD, 2023.
4. 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.

**CO – PO – PSO Mapping**

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	3	2	-	1	3	-	-	-	-	2	-	-	-	-
CO2	3	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	2	1	-	1	-	-	-	-	2	-	-	-	-
CON	2.8	1.8	2.2	1.5	1	1	2	-	-	-	-	2	-	-	-	-

**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 –Independent and Dependent Sources – Simple problems- Nodal Analysis, 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, three phase Alternator, Synchronous motor and Three Phase Induction Motor.

**UNIT-III ANALOG ELECTRONICS 9**

Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon & Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET, IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters.

**UNIT-IV DIGITAL ELECTRONICS 9**

Review of number systems, binary codes, error detection and correction code Combinational logic - representation of logic functions-SOP and POS forms, K-m 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- Data acquisition.

**TOTAL: 45 PERIODS****OUTCOMES:**

- Ability to compute the electric circuit parameters for simple problems
- Ability to explain the working principle and applications of electrical machines
- Ability to analyze the characteristics of analog electronic devices
- Ability to explain the basic concepts of digital electronics
- Ability to explain the operating principles of measuring instruments

**TEXTBOOKS:**

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 textbook 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.

**REFERENCE BOOKS:**

1. Thomas L. Floyd, 'Digital Fundamentals', 11<sup>th</sup> Edition, Pearson Education,
2. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill Education; 7<sup>th</sup> edition, 2017.
3. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
4. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

**CO – PO – PSO Mapping**

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	3	2	-	1	3	-	-	-	-	2	-	-	-	-
CO2	3	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2		2	1	-	1	-	-	-	-	2	-	-	-	-
CON	2.8	1.8	2.2	1.5	1	1	2	-	-	-	-	2	-	-	-	-



**அலகு I மொழி மற்றும் இலக்கியம்**

3

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

**அலகு II மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் – சிற்பக் கலை**

3

நடுகல் முதல் நவீன சிற்பங்கள் வரை –ஜம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள் , பொம்மைகள்- தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள்

**அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**

3

நாட்டுப்புற கதைகள், பாடல்கள்-தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து- ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம்- வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்

**அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள்**

3

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

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

3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியா மற்றும் வெளிநாட்டின் பிற பகுதிகளின் தமிழ்ப் பண்பாட்டின் தாக்கம்- சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு- கல்வெட்டுகள், கையெழுத்துப்படிக்கள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு

**Total Periods: 15 hours****TEXT CUM REFERENCES:**

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – முனைவர். இல.சுந்தரம். (விகடன் பிரசுரம்)

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

**UNIT I LANGUAGE AND LITERATURE 3**

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

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

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - Massive Terracotta sculptures, Village deities.

**UNIT III FOLK AND MARTIAL ARTS 3**

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

**UNIT IV THINAI CONCEPT OF TAMILS 3**

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

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

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

**Total Periods: 15 hours**

**TEXT CUM REFERENCES:**

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

**CO – PO – PSO Mapping**

CO	PO												PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	
CO1																	
CO2																	
CO3																	
CO4																	
CO5																	
CON																	

**SEMESTER- I****(Common to all branches of B.E. / B.Tech Programmes)****OBJECTIVES:**

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

**LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)**

1. Calculation of lattice cell parameter – X-ray diffraction method.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
3. (a). Compact disc- Determination of width of the groove using Laser.  
(b). Determination of particle size using Laser
4. (a) Determination of wavelength using Laser  
(b) Determination of acceptance angle and numerical aperture in an optical fiber.
5. Determination of Planck's constant using LED.
6. Determination of thickness of a thin wire – Air wedge method
7. Determination of wavelength of mercury spectrum – spectrometer grating
8. Determination of rigidity modulus – Torsion pendulum
9. Determination of Young's modulus by non-uniform bending method.

**TOTAL: 30 PERIODS****OUTCOMES:**

At the end of the course, the students should be able

- Understand the functioning of various physics laboratory equipment.
- Use graphical models to analyze laboratory data.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.

- Access, process and analyze scientific information.
- Solve problems individually and collaboratively.

#### REFERENCES:

1. Wilson J.D. and Hernandez Hall C.A.,— Physics Laboratory Experiments, Houghton Mifflin Company, New York, 2005.
2. S. Srinivasan, A Text Book of Practical Physics, S. Sultan Chand publications. 2005
3. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

#### CO – PO – PSO Mapping

CO	PO												PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	
CO1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
CON	3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-	-	-	-

**OBJECTIVES**

- To inculcate experimental skills to test basic understanding of water quality parameters, such as acidity, alkalinity, hardness, DO, TDS, chloride, and chlorine.
- To familiarise the students with electroanalytical techniques like conductometry and flame photometry to determine the impurities in aqueous solution.
- To find the various characteristics of domestic water.
- To understand the Pseudo first-order kinetics reaction.
- To make the students know the synthesis of nanoparticles.

**LIST OF EXPERIMENTS**

1. Determination of chloride content of water sample by Argentometric method.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Preparation of  $\text{Na}_2\text{CO}_3$  as a primary standard and estimation of acidity of a water sample using the primary standard.
5. Determination of types and amount of alkalinity in water samples.
6. Estimation of available chlorine in bleaching powder solution.
7. Conductometric titration of barium chloride against sodium sulfate (Precipitation titration).
8. Estimation of sodium /potassium present in water using a flame photometer.
9. Estimation of TDS of a water sample by gravimetry.
10. Preparation of nanoparticles ( $\text{Ag}/\text{Au}/\text{TiO}_2/\text{ZnO}/\text{CuO}$ ).
11. Pseudo first-order kinetics- ester hydrolysis.

**TOTAL: 30 PERIODS****OUTCOMES:****At the end of the course, the student should be able:**

- To infer the quality of water samples for alkalinity, hardness, DO, TDS, chloride, and chlorine.
- To apply the knowledge on the estimation of metal ions, acidity and its precipitation nature towards their process.
- To recognize the threshold limit for various characteristics of domestic water.
- To identify the simple method of synthesis of nanoparticles.
- To understand the pseudo first-order kinetics reaction from ester hydrolysis.

**TEXTBOOKS :**

1. Vogel's Textbook of Quantitative Chemical Analysis (8th Edition, 2014).
2. Suchi Tiwari, Engineering Chemistry Lab Manual, Scitech Publications (India) Pvt. Ltd. (2nd Edition, 2013).
3. Pushpendra Kumar, Laboratory Manual for Engineering Chemistry, Reyansh Authortopic Pvt. Ltd., (1st Edition, 2022).

**CO – PO – PSO Mapping**

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	1	1	1	-	1	-	-	-	-	-	-	-	-	-
CO2	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO3	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	2	1	1	1	2	-	-	-	-	-	-	1	-	-	-	-
CO5	2	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-
CON	2	1	1	1	1.2	-	1	-	-	-	-	1	-	-	-	-



**OBJECTIVES:**

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To provide hands on training for fabrication of components using carpentry, sheet metal and welding equipment / tools
- To gain the skills for making fitting joints and assembling air conditioner
- To develop the skills for making simple electrical wiring connections using suitable tools
- To provide hands on experience for soldering and gain knowledge about the behavior of electronics components

**GROUP A (CIVIL & MECHANICAL)****I CIVIL ENGINEERING PRACTICE****15****Buildings:**

- a) Study of plumbing and carpentry components of residential and industrial buildings safety aspects.

**Plumbing Works:**

- a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
- b) Study of pipe connections requirements for pumps and turbines. Preparation of plumbing line sketches for water supply and sewage works.
- c) Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
- d) Demonstration of plumbing requirements of high-rise buildings.

**Carpentry works:**

- a) Study of the joints in roofs, doors, windows and furniture.
- b) Hands-on-exercise:  
Wood work, joints by sawing, planning and cutting.

## II MECHANICAL ENGINEERING PRACTICE

15

### Welding:

- a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding. b) Gas welding practice - Study

### Basic Machining:

- a) Facing
- b) Simple Turning
- c) Step Turning

### Sheet Metal Work:

- a) Forming & Bending
- b) Model making – Trays

### Demonstration on:

- a) Smithy operations, upsetting, swaging, setting down and bending.
- b) Foundry operations like mould preparation for gear and step cone pulley.
- c) Assembly of centrifugal pump
- d) Assembly of air conditioner

## GROUP B (ELECTRICAL & ELECTRONICS)

## III ELECTRICAL ENGINEERING PRACTICE

15

1. Residential house wiring using Switches, Fuse, Indicator, Lamp and Energy meter.
2. Fluorescent Lamp Wiring.
3. Staircase Wiring.
4. Measurement of Voltage, Current, Power and Power factor in electrical circuit.
5. Measurement of Energy using Analog & Digital Energy meter.
6. Measurement of Earth Resistance.
7. Study of Industrial house wiring.
8. Identification & Study of protective devices: Fuses & Fuse carriers, MCB, ELCB and Isolators with ratings and usage.

#### IV ELECTRONICS ENGINEERING PRACTICE

15

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, RMS period, frequency) using CR.
2. Study of logic gates AND, OR, EX-OR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

**TOTAL: 60 PERIODS**

#### OUTCOMES:

On successful completion of this course, the student will be able to Carry out various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering

- Fabricate carpentry components and pipe connections including plumbing works and use welding equipment's to join the structures.
- Carry out the basic machining operations, make the models using sheet metal works.
- Illustrate on centrifugal pump, air conditioner, operations of smithy, foundry and fittings
- Carry out basic home electrical works and measure the electrical quantities
- Elaborate on the electronics components, gates and soldering practices.

#### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS: CIVIL

- |   |         |
|---|---------|
| 1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. | 15 Sets |
| 2. Carpentry vice (fitted to work bench)  | 15 Nos. |
| 3. Standard woodworking tools   | 15 Sets |
| 4. Models of industrial trusses, door joints, furniture joints  | 5 each  |

#### MECHANICAL

- |   |        |
|---|--------|
| 1. Arc welding transformer with cables and holders                            | 5 Nos. |
| 2. Welding booth with exhaust facility  | 5 Nos. |
| 3. Welding accessories like welding shield, chipping hammer, wire brush, etc. | 5 Sets |
| 4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.    | 2 Nos. |

- |   |          |
|---|----------|
| 5. Centre lathe   | 2 Nos.   |
| 6. Hearth furnace, anvil and smithy tools                   | 2 Sets   |
| 7. Moulding table, foundry tools                            | 2 Sets   |
| 8. Power Tool: Angle Grinder                                | 2 Nos.   |
| 9. Study-purpose items: centrifugal pump, air-conditioner   | One each |
| 10. Fitting tools, Hack saw frame, 12' file, hack saw blade | 5 Nos.   |

### ELECTRICAL

- |  |         |
|--|---------|
| 1. Assorted electrical components for house wiring | 15 Sets |
| 2. Fluorescent Lamp                                | 15 Sets |
| 3. Electrical measuring instruments                | 10 Sets |
| 4. Analog & Digital energy meter                   | 5 Sets  |
| 5. Megger  | 2       |

### ELECTRONICS

- |   |         |
|---|---------|
| 1. Soldering guns   | 10 Nos. |
| 2. Assorted electronic components for making circuits                 | 50 Nos. |
| 3. Small PCBs   | 10 Nos. |
| 4. Multimeters  | 10 Nos. |
| 5. Study purpose items: Telephone, FM radio, low-voltage power supply |         |

### CO – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	-	-	-	-	1	-	-	-	-	-	1	2	-	3	-
CO2	-	1	2		3	-	-	-	-	-	1	-	-	-	2	-
CO3	-	-	-	3	2	-	-	-	-	-	-	1	1	-	-	2
CO4	-	2	3	1	2	-	-	-	-	-	-	-		2	-	-
CO5	-	3	2	2	-	-	-	-	1	-	-	-	2	-	-	-
CON	3	2	2.3	2	2.3	1	-	-	1	-	1	1	1.6	2	2.5	2

**OBJECTIVES:**

The course aims to

- Enhance the employability and career skills of students.
- Orient the students towards grooming as a professional.
- Make them industry ready.
- Develop their confidence and help them attend interviews successfully.
- Help students to interact confidently in a professional scenario.

**UNIT 1: PRONUNCIATION****6**

Tone- Pronunciation – Intonation- Reading Aloud and Addressing- Syllable- Rhythm- Accent- Wrongly Pronounced words -Poetry Reading

**UNIT 2: NON VERBAL COMMUNICATION****6**

Non Verbal Communication - Facial expressions- Eye contact - Subtle (and not so subtle) gestures -Tone of voice – Touch- Posture -Personal space.

**UNIT 3: SELF INTRODUCTION AND PRESENTATION****6**

Self Introduction- Introducing oneself to the audience- Introducing the Topic – answering questions – Individual Presentation Practice – Presenting Visuals effectively -5 Minute Presentations.

**UNIT 4: BASICS OF SOFT SKILLS****6**

Recognizing differences between groups and teams – managing time – networking professionally – Respecting social protocols- understanding career management – Developing a long - term career plan- making career changes.

**UNIT 5: GROUP DISCUSSION****6**

Introduction to Group Discussion – Participating in Group discussions – Understanding group dynamics – Brainstorming the Topic – Questioning and Clarifying – GD Strategies – activities to improve GD Skills.

**TOTAL: 30 PERIODS**

## OUTCOMES:

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

- Pronounce the words correctly.
- Understand the nonverbal clues.
- Make an effective presentation.
- Adequate soft skills required for the workplace.
- Participate confidently in Group Discussions.

## REFERENCES:

1. Professional Communication by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2014.
2. Soft Skills by S. Hariharan , N. Soundarajaran and S.P. Shanmugapriya MJP Publishers, Edition: 2013
3. Soft Skills for Everyone by Butterfield , Jeff, Cengage Learning India Pvt. Ltd.,2015. New Delhi..

## CO – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	-	-	-	1	-	-	-	-	-	3	-	1	-	-	-	-
CO2	1	1	-	-	-	-	1	-	-	2	-	1	-	-	-	-
CO3	2	2	1	2	2	-	-	-	-	3	-	1	-	-	-	-
CO4	2	1	1	-	-	-	3	-	-	3	-	1	-	-	-	-
CO5	-	1	-	1	-	-	-	-	-	3	-	1	-	-	-	-
CON	1.6	1.2	1	1.3	2	-	2	-	-	2.8	-	1	-	-	-	-

## SEMESTER – II

EN3211

PROFESSIONAL ENGLISH – II

L T P C  
3 0 0 3

### OBJECTIVES:

The course prepares the second semester Engineering students

- To develop strategies and techniques to enhance their reading skills.
- To engage them in meaningful activities in order to improve their listening, speaking, reading and writing skills.
- To improve their ability to write effective job application, resumes and draft impressive reports.
- To develop analytical thinking skills for problem solving in communicative contexts.
- To participate in group discussions.

### UNIT – I: MAKING COMPARISON

9

**Listening:** Clippings of Ted talk, cartoon and interviews of sports personalities for listening and discussion.

**Speaking:** Descriptions and discussions based on newspaper.

**Reading:** Learning shades of meaning (using Thesaurus) and inferring the context from general passages.

**Writing:** Compare & Contrast essays and Jumbled Sentences.

**Language and Vocabulary development:** Prepositional phrases, contextual meaning of words. Verbal Analogy, Same word used as Noun and Verb.

### UNIT – II: EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING

9

**Listening:** Anecdotes to be read from books like Chicken Soup books. Evaluative listening – Advertisement and Product description.

**Speaking:** Marketing a product, persuasive speech

**Reading:** Description of any product / jewellery, Brochures and Manual.

**Writing:** Formal letters- letters of complaint, appreciation, and suggestion, Comprehension and E-mail (formal)

**Language and Vocabulary development:** Active & Passive, Infinitive, Gerund, Purpose Statements, Adverbs and Word formation

**UNIT – III: ABILITY TO PUT IDEAS OR INFORMATION COGENTLY** **9**

**Listening:** Listen to English songs and find the lyrics/new words

**Speaking:** Role play and Interviews

**Reading:** Reading magazine articles, Excerpts from literary texts

**Writing:** Job Application, Resume, Cover letter, SWOC Analysis and Recommendations.

**Language and Vocabulary development:** Correction of errors, If conditional, Sentence completion and Connotations.

**UNIT – IV: ANALYZING PROBLEMS AND EXPRESSING SOLUTIONS** **9**

**Listening:** Watching Stand-up comedies and comprehending ideas expressed there.

**Speaking:** Speak about the Stand-up comedies viewed and express personal views about the same

**Reading:** Reading different types of books (novels, short stories, biographies, magazines etc. and speaking about the same.

**Writing:** Dialogue Writing, Checklist and Problem Solving essays.

**Language and Vocabulary development:** Reported Speech, Modals, Slogan writing and Conjunctions.

**UNIT – V: REPORTING EVENTS** **9**

**Listening:** Listening to spot errors, listening to varied dialects and accents of English.

**Speaking:** Group discussion- Expression of opinions, assertion, coercion etc.

**Reading:** Reading life experiences of common man from magazines.

**Writing:** Accident Report / Survey Report and Letters to the Editor.

**Language and Vocabulary development:** Numerical Adjective, Idioms, Vocabulary Shades of Meaning.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

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

- To compare and contrast ideas and information from technical texts.
- To incorporate basic grammar structures to express appreciation, suggestion and complaint in writing.
- To draft effective resumes using appropriate vocabulary and to avoid common errors.
- To analyse problems so as to arrive at appropriate solutions and to communicate relevantly.
- To draft technical reports, letters and to express ideas creatively.



**TEXT BOOKS:**

1. English for Science and Technology Cambridge University Press,2021. Dr.Veena Selvam, Dr.Sujatha Priyadarshini, Dr. Deep Mary Francis, Dr.K.N.Shoba and Dr.Lourdes Joevani, Department of English, Anna University.
2. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2016, New Delhi.
3. Technical English for Professional – Advanced by C. Gangalakshmi, B. Rathika and L. Saranraj, Cengage Learning India Pvt. Ltd.,2022.

**REFERENCES:**

1. Learning to communicate – Dr. V. Chellammal, Oxford Univ.Press,2001 New Delhi.
2. Business Correspondence and Report Writing by Prof. R. C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
3. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.
4. Improve Your Writing ed. V.N Arora Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
5. English For Engineers and Technologists, Orient Blackswan Private Ltd. Department of English, Anna University,2020.

**CO – PO – PSO Mapping**

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	-	1	2	1	-	-	-	-	-	3	-	1	-	-	-	-
CO2	2	2	1	2	2	-	-	-	-	3	1	1	-	-	-	-
CO3	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-
CO4	2	3	2	3	-	-	2	-	-	3	-	-	-	-	-	-
CO5	2	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-
CON	2	2	1.4	2	2	-	2	-	-	2.8	1	1	-	-	-	-

**OBJECTIVES:**

- This course aims at providing the necessary basic concepts of statistical and Numerical Methods for solving numerically different problems of engineering and Technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and differentiation and integration in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

**UNIT-I: STATISTICAL HYPOTHESIS TESTS****9L+3T**

Sampling distributions - Tests for single mean 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-II: EXPERIMENTAL DESIGN FOR ANOVA****9L+3T**

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design

**UNIT-III: SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS****9L+3T**

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 method of Gauss Seidel – Dominant Eigenvalue of a matrix by Power method.

**UNIT-IV: INTERPOLATION, NUMERICAL DIFFERENTIATION AND  
NUMERICAL INTEGRATION****9L+3T**

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Numerical integrations using Trapezoidal, Simpson's rules.

**UNIT-V: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**

**9L+3T**

Single step methods: Taylor’s series method - Euler’s method - Modified Euler’s method  
 Fourth order Runge-Kutta method for solving first order equations - Multi step methods:  
 Milne’s and Adams -Bash forth predictor corrector methods for solving first order equations.

**TOTAL: 45L+15T PERIOD**

**OUTCOMES:**

- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications design of experiments in the field of agriculture.
- Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
- Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
- Solve the ordinary differential equations with initial and boundary conditions by using certain techniques with engineering application.

**TEXT BOOKS:**

1. Grewal. B.S. and Grewal. J.S., “Numerical Methods in Engineering and Science ”, 10<sup>th</sup> Edition, Khanna Publishers, New Delhi, 2015.
2. 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.

**REFERENCE:**

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.

**CO – PO – PSO Mapping**

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CON	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-

**OBJECTIVES:**

- To provide information on the free electron theories and to understand the electrical properties of conducting material.
- To teach the basic knowledge of semiconductors and their applications.
- To enhance the idea of magnetic materials in storage devices and also to enrich the basic knowledge of superconductors and their applications.
- To gain knowledge about the interaction of photons with materials and optoelectronic devices.
- To understand the fundamental concepts of nanomaterials and quantum computing.

**UNIT – I: CONDUCTING MATERIALS****9**

Classical free electron theory - postulates - Expression for electrical conductivity and thermal conductivity - Wiedemann-Franz law - Success and failures - Quantum free electron theory (qualitative) - Fermi distribution function - Density of energy states - Electron in periodic potential - Energy bands in solids - Low and high resistivity alloys.

**UNIT – II: SEMICONDUCTOR PHYSICS****9**

Properties - Intrinsic semiconductors - Direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors - Extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors - Variation of Fermi level with temperature and impurity concentration - Variation of carrier concentration with temperature for extrinsic semiconductors - Hall effect - Theory and experiment and applications.

**UNIT – III: MAGNETIC MATERIALS AND SUPERCONDUCTOR****9**

Basic definitions of magnetism - Classification (based on spin): Diamagnetism, Paramagnetism, Ferromagnetism, anti-Ferromagnetism and ferrimagnetism - Ferromagnetic domain theory - Energy involved in domains - Hysteresis curve - Temporary and permanent magnetic materials, examples and uses - Magnetic principles in computer data storage - Magnetic hard disc (GMR sensor). Superconductors - properties - Applications (Magnetic levitation, Cryotron and SQUID).

#### **UNIT – IV: OPTOELECTRONIC DEVICES**

**9**

Classification of optical materials - Optical processes in semiconductors: optical absorption and emission - carrier injection and recombination - Photodiode - Solar cell - Light Emitting Diode - Organic Light Emitting Diode - Quantum dot laser - Optical data storage devices-plasmonics.

#### **UNIT – V: NANODEVICES AND QUANTUM COMPUTING**

**9**

Introduction - Quantum confinement - Quantum structures (qualitative) - Band gap of nanomaterial - Single Electron Transistor (SET): Tunnelling - Coulomb-blockade effect - Carbon nanotubes: Properties and applications. Quantum cellular automata (QCA) - Quantum system for information processing - Characteristics and working of quantum computers - Advantages and disadvantages of quantum computing over classical computing.

**TOTAL: 45 PERIODS**

#### **OUTCOMES:**

At the end of the course, the students should be able

1. To understand the classical and quantum-free electron theories, and energy bands in solids.
2. To apply the concepts of semiconductor Physics and its applications in various devices.
3. To apply the properties of magnetic materials and superconductors in various fields.
4. To understand the basics of optical materials and apply knowledge to develop materials for optoelectronic devices.
5. To know the concepts and applications of quantum structures and the basics of quantum computing.

#### **TEXTBOOKS:**

1. Kasap, S.O., "Principles of Electronic Materials and Devices", McGraw-Hill Education, 2007.
2. M. Arumugam, "Semiconductor Physics and optoelectronics", Anuradha agencies, 2003.
3. Kittel, C., "Introduction to Solid State Physics", Wiley, 2005.
4. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials". Narosa Publishing House, 2009.
5. B. K. Pandey., S. Chaturvedi., "Engineering Physics", Cengage Learning, 2012.
6. V.Rajendiran, Engineering Physics, Tata McGraw-Hill, New Delhi. 2011.

## REFERENCES:

1. B. N. Sankar., S. O. Pillai., “Engineering Physics” New age international publishers, 2007.
2. Donald .A.Neamen., “Semiconductor Physics and devices” Tata Mc Graw-Hill, New Delhi. 2007
3. Rogers, B., Adams, J. & Pennathur, S. “Nanotechnology: Understanding small systems”, CRC Press, 2014.

## ONLINE RESOURCES:

1. “Optoelectronics - An introduction” -Jhon Wilson and Jhon Hawkes- Prentice Hall Europe- ISBN 0-13-1039M-X
2. “Quantum Computing -A Gentle Introduction”- Eleanor Rieffel and Wolfgang Polak - ISBN 978-0-262-01506-6
3. “An introduction to Quantum Computing” -NPTEL - <https://nptel.ac.in/courses/106106232>

## CO – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO2	3	1	2	-	1	-	-	-	-	-	-	1	-	-	-	-
CO3	3	-	1	-	2	1	1	-	-	-	-	1	-	-	-	-
CO4	3	-	2	1	3	-	1	-	-	-	-	1	-	-	-	-
CO5	3	1	2	1	2	1	2	-	-	-	-	1	-	-	-	-
CON	3	1	1.7	1	2	1	1.3	-	-	-	-	1	-	-	-	-

**OBJECTIVES:**

- To make the students acquainted with various energy sources, storage devices, and battery technology.
- To acquaint the student with the principles of photochemistry, application of spectroscopy, and sample analyzing techniques.
- To understand the preparation, properties, and engineering applications of functional materials, nanoreactors, nanoelectronics, and sensors.
- To make the student conversant with the basics of composites, their properties, and applications in memory devices.
- To acquaint the students with the basics of biomolecule networks, metabolic pathways, drug design applications, drawing tools, and structure visualizations.

**UNIT I ENERGY SOURCES AND STORAGE DEVICES 9**

Introduction - nuclear energy - light water nuclear power plant - breeder reactor, solar energy conversion - solar cells: principle, working and applications. Types of batteries - primary battery (alkaline battery), secondary battery (lead acid battery, NICAD battery, lithium-ion battery), fuel cells (H<sub>2</sub>-O<sub>2</sub> fuel cell). Supercapacitors: storage principle, applications. Electric vehicles-working principles.

**UNIT II PHOTOCHEMISTRY AND SPECTROSCOPY 9**

Photochemistry: laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law, and Lambert-Beer Law, quantum efficiency - determination - Jablonski diagram: internal conversion, intersystem crossing, fluorescence, phosphorescence, chemiluminescence, and photo-sensitization - applications. Spectroscopy: electromagnetic spectrum - absorption of radiation - electronic, vibrational, and rotational transitions, UV-visible and IR spectroscopy: principles, instrumentation (block diagram) - applications.

**UNIT III SMART MATERIALS 9**

Introduction - organic functional materials: preparation, properties, and engineering applications of graphite, fullerenes, carbon nanotubes, smart materials: nanoporous zeolites, self-assembled nanoreactors, nanostructures for molecular recognition, the chemistry of nanoelectronics: data memory, lighting, and displays, thin films, OLEDs, sensors: electrochemical sensors, neuro-electronic interfaces.

**UNIT IV                    NANOCOMPOSITES & MEMORY DEVICES                    9**

Introduction - definition - need, constitution: matrix materials (polymer matrix, metal matrix) and reinforcement (fiber), properties and applications of metal matrix composites (MMC), and polymer matrix composites - micro and nanoelectromechanical systems, applications of nanomaterials in memory devices.

**UNIT V                    CHEMINFORMATICS                    9**

Introduction - coordinate-bond, bond length, bond angles, torsional angles - chemical structure - confirmation - representation of structural information - sources - formats - graph theory - molecular numerology - storage of structural data - databases - types - fingerprint - similarity search - applications of cheminformatics in drug designing.

**Total Periods: 45**

**OUTCOMES:**

**At the end of the course, the student should be able:**

1. To apply the gained knowledge on different energy sources and storage devices.
2. To recognize the principle and concepts in photochemistry and spectroscopy.
3. To recommend smart materials and sensors for the development of innovative materials.
4. To utilize the different composites and memory devices.
5. To identify the structural information about different materials with help of software.

**TEXTBOOKS:**

1. Shikha Agarwal, "Engineering Chemistry"-Fundamentals and Applications, 2nd Edition, Cambridge University Press, New Delhi, 2019.
2. P. C. Jain and Monika Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2019.
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.



**REFERENCES:**

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. S.S. Dara and S.S. Umare, "A Text Book of Engineering Chemistry", 12th Edition, S. Chand & Company LTD, New Delhi, 2018.
3. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Publishing Company LTD, 2023.
4. O. G. Palanna, Engineering Chemistry, McGraw Hill Education (India) Pvt, Ltd, New Delhi, 2017.

**CO – PO – PSO Mapping**

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	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	1	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-
CO2	1	1	-	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	1	-	1	-	2	-	-	-	-	-	-	1	-	-	1	-
CO4	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	1	-	-	3	-	-	-	-	-	-	-	2	-	-	-
CON	1.6	1	1	2	2.2	-	1	-	-	-	-	1	2	-	1	-

## **OBJECTIVES**

- To know the basics of Python programming and write simple programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures and its implementation – lists, tuples, dictionaries.
- To understand Object Oriented Concept in Python.

<b>UNIT I</b>	<b>PYTHON BASICS</b>	<b>9</b>
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Introduction to Python – Literals – Variables and Identifiers – Data Types – Input Operation – Comments – Reserved words – Indentation – Operators and Expressions – Modes of python. Conditionals: Boolean values and operators - conditional if - alternative if - chained conditional - Iteration, Illustrative programs: Basic Arithmetic Operations, GCD of numbers, Square root (Newton's Method).

<b>UNIT II</b>	<b>FUNCTIONS, LIST, TUPLES</b>	<b>9</b>
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Functions, function definition and use. **Fruitful functions:** return values, parameters, local and global scope, recursion. **Lists:** list operations, list slices, list methods, list loop, mutability, list parameters; **Tuples:** tuple assignment, tuple as return value. Comparison of Lists and tuples. Illustrative programs: exchange the values of two variables, square root, Linear and Binary search. Fibonacci series using functions.

<b>UNIT III</b>	<b>STRINGS, DICTIONARY, SET</b>	<b>9</b>
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**Strings:** string slices, immutability, string functions and methods, string module. **Dictionaries:** Operations (create, access, add, remove) and methods. (Insert, delete). Set operation (Access, Add, Remove). Illustrative programs: creates a dictionary of radius of a circle and its circumference.

<b>UNIT IV</b>	<b>FILES, EXCEPTIONS, MODULES AND PACKAGES</b>	<b>9</b>
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**Files and exception:** Text Files, Reading and Writing files, Format operator; Errors and Exceptions, Handling Exceptions, Multiple Except blocks, Modules, Packages; Illustrative programs: word count, copy file, Creating user defined Exceptions.

**Classes and Objects:** Introduction, Classes and Objects, Defining Classes, Creating Objects, Data Abstraction and Hiding, The Class Method and Self Argument, The `__init__()` method, Class Variables and Object Variables, Public and Private data members, Private Methods. Illustrative Programs: Creating Student Class and Objects.

**TOTAL: 45 PERIODS**

## OUTCOMES

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

- Develop simple computational problems using control flow statements.
- Decompose a Python program into functions, Modules and Packages.
- Represent compound data using Python lists, tuples, Strings, Set and dictionaries.
- Read and write data from/to files and Exception handling in Python Programs.
- Understand the concepts of Object Oriented Programming and to develop real time applications.

## TEXT BOOKS:

1. Reema Thareja, “Python Programming using Problem solving Approach”, Oxford Higher Education, 2018.
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016 (<http://greenteapress.Com/wp/think-python/>)
3. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python” – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

## REFERENCES:

1. Charles Dierbach, “Introduction to Computer Science using Python: A Computational Problem-Solving Focus”, Wiley India Edition, 2013.
2. John V Guttag, “Introduction to Computation and Programming Using Python”, Revised and expanded Edition, MIT Press , 2013
3. Kenneth A. Lambert, “Fundamentals of Python: First Programs”, CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, “**Practical Programming: An Introduction to Computer Science using Python 3**”, Second edition, Pragmatic Programmers, LLC, 2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, “**Introduction to Programming in Python: An Inter-disciplinary Approach**”, Pearson India Education Services Pvt. Ltd., 2016.

**WEB REFERENCES:**

1. <http://greenteapress.com/wp/think-python/>
2. [www.docs.python.org](http://www.docs.python.org)
3. <https://nptel.ac.in/courses/106/106/106106182/>

**CO – PO – PSO Mapping**

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	3	2	-	-	-	-	-	2	2	2	-	-	1
CO2	3	3	3	3	2	-	-	-	-	-	2	2	-	-	3	-
CO3	3	3	3	3	2	-	-	-	-	-	2	-	-	-	1	-
CO4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	2	-
CO5	1	2	-	-	1	-	-	-	-	-	1	-	-	-	-	1
CON	2.4	2.6	3	2.8	1.8	-	-	-	-	-	1.6	2	2.5	-	2	1

**அலகு I****நெசவு மற்றும் பானைத் தொழில்நுட்பம் :****3**

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

**அலகு II****வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்****3**

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

**அலகு III****உற்பத்தித் தொழில்நுட்பம் :****3**

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

**அலகு IV****வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் :****3**

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

**அலகு V****அறிவியல் தமிழ் மற்றும் கணித்தமிழ் :****3**

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

**TOTAL : 15 PERIODS**

## TEXT – CUM – REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி / வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. 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).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by : International Institute of Tamil Studies.)
9. Keeladi – ‘Sangam City Civilization on the banks of river Vaigal’ (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by : The Author)
11. Porunai Civilization (Jointly Published by : Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R. Balakrishnan) (Published by : RMRL) – Reference Book.

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CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1																
CO2																
CO3																
CO4																
CO5																
CON																

**GE3211**

**TAMILS AND TECHNOLOGY**

**L T P C**

**1 0 0 1**

**UNIT I WEAVING AND CERAMIC TECHNOLOGY**

**3**

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

**UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY**

**3**

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

**UNIT III MANUFACTURING TECHNOLOGY**

**3**

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

**UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY**

**3**

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

**UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING**

**3**

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

**TOTAL : 15 PERIODS**

**TEXT – CUM – REFERENCE BOOKS**

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
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CO1																	
CO2																	
CO3																	
CO4																	
CO5																	
CON																	



**OBJECTIVES:**

The main learning objective of this course is to impart knowledge

- To draw the conics curves & special curves, use BIS conventions, and specifications for engineering drawing.
- To draw the orthographic projection of lines and plane surfaces.
- To draw the projections and solids and Isometric projection of simple solids.
- To draw the section of solids and the development of surfaces.
- To draw free hand sketching of basic geometrical constructions, multiple views of objects and Perspective Projection of simple solids.

**CONCEPTS AND CONVENTIONS (Not for Examination)****1**

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

**UNIT-I: PLANE CURVES AND SPECIAL CURVES****11**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid (Rolling Circle rolls on flat surface only). construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

**UNIT-II: PROJECTION OF POINTS, LINES AND PLANE SURFACES****12**

Orthographic projection- Principles-Principal planes - First angle projection-projection of points at the First Quadrant only. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) which inclined to both the principal planes by rotating object method.

**UNIT-III: PROJECTION OF SOLIDS AND ISOMETRIC PROJECTION****12**

Projection of simple solids like prisms, pyramids, cylinders and cones when the axis is inclined to one of the principal planes by the rotating object method. Principles of isometric projection – isometric scale – Isometric projections of simple solids - Prisms, pyramids, cylinders, cones - isometric view of the object from the 2D coded plan.

**UNIT-IV: PROJECTION OF SECTIONED SOLIDS & DEVELOPMENT OF SURFACES 12**

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

**UNIT-V: FREE-HAND SKETCHING AND PERSPECTIVE PROJECTIONS 12**

Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects. Perspective projection of simple solids-Prisms and pyramids by visual ray method.

**TOTAL: (L=15;P=60)75 PERIODS**

**OUTCOMES:**

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

1. To construct the conics curves and special curves, use BIS conventions, and specifications for engineering drawing.
2. To construct the orthographic projection of lines and plane surfaces.
3. To construct the projections and solids and Isometric projection of simple solids.
4. To construct projections of section of solids and development of surfaces.
5. To construct free hand sketching of basic geometrical constructions, multiple views of objects and Perspective Projection of simple solids

**TEXTBOOKS:**

1. N.D.Bhatt, “Engineering Drawing (Plane and Solid Geometry)”, Charotar Publishing House PVT. LTD. 53<sup>rd</sup> Edition 2019 (Fifth Reprint)
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 15<sup>th</sup> Edition 2018

**REFERENCES:**

1. T. Jeyapooan, “Engineering Graphics Using Auto CAD”, Vikas Publishing House Pvt. LTD, seventh Edition, 2015.
2. 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.

3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2<sup>nd</sup> Edition, 2011.
4. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2<sup>nd</sup> Edition, 2011.
5. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2013.

**Publication of Bureau of Indian Standards:**

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

**Special points applicable to University Examinations on Engineering Graphics:**

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scales to fit solutions within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

**CO – PO – PSO Mapping**

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	1	2	-	2	-	-	-	-	3	-	2	2	1	-	1
2	3	1	2	-	2	-	-	-	-	3	-	2	2	1	-	1
3	3	1	2	-	2	-	-	-	-	3	-	2	2	1	-	1
4	3	1	2	-	2	-	-	-	-	3	-	2	2	1	-	1
5	3	1	2	-	2	-	-	-	-	3	-	2	2	1	-	1
<b>Avg</b>	<b>3.0</b>	<b>1.0</b>	<b>2.0</b>	<b>-</b>	<b>2.0</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>3.0</b>	<b>-</b>	<b>2.0</b>	<b>2.0</b>	<b>1.0</b>	<b>-</b>	<b>1.0</b>

**OBJECTIVES:**

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries and read and write data from/to files in Python.
- Use simple Object Oriented Concepts.

**LIST OF PROGRAMS**

1. Compute the GCD of two numbers.
2. Find the square root of a number. (Newton's method)
3. Find exponentiation of a number. (power of a number)
4. Find the maximum of a list of numbers.
5. Program for basic calculator operations using functions.
6. Generate Fibonacci series using function.
7. Program for Armstrong number.
8. Program for check the number is Palindrome or Not.
9. Program for sum of array of numbers.
10. How to create, slice, change, add, delete and index elements using list.
11. Linear search and Binary search.
12. Find First n prime numbers.
13. Program to remove duplicate elements from a list.
14. Program for addition and transpose of a matrix.
15. How to create, slice, change, delete and index elements using Tuple.
16. Write a program to reverse the string.
17. How to change, delete, add and remove elements in Dictionary.
18. Create a dictionary of radius of circle and its circumference.
19. Program for count the number of words in a file.
20. Find the most frequent words in a text read from a file.
21. Program for student information system using class and objects.
22. Program for Employee Payroll Processing using class and objects.

## PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

**TOTAL: 60 PERIODS**

## COURSE OUTCOMES

- Develop solutions to simple computational problems using Python programs.
- Solve problems using conditionals and loops in Python.
- Develop Python programs by defining functions and calling them.
- Use Python lists, tuples and dictionaries for representing compound data.
- Develop Python programs using files and OOPS concept.

## CO – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	3	3	-	-	-	-	-	3	2	1	3	-	-
CO2	3	3	3	3	3	-	-	-	-	-	3	2	-	-	2	-
CO3	3	3	3	3	2	-	-	-	-	-	2	-	-	3	-	2
CO4	3	2	-	2	2	-	-	-	-	-	1	-	-	-	1	-
CO5	1	2	-	-	1	-	-	-	-	-	1	-	1	-	2	2
CON	2.6	2.6	3.0	2.7	2.2	-	-	-	-	-	2.0	2.0	1.0	3.0	1.7	2.0

**OBJECTIVES:**

- To gain practical knowledge and to co-relate with the theoretical studies.
- To achieve perfectness in experimental skills and the study of practical applications.
- To bring more confidence and ability to develop and fabricate engineering and technical equipment.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To make the student as an active participant in each part of all lab exercises.

**LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)**

1. Determination of the electrical conductivity of metals by plotting a current-voltage characteristic curve.
2. Determination of band gap of a semiconductor.
3. Determination of Fermi energy. (Measurement of Fermi energy in copper).
4. Study of I-V characteristics of solar cell and determination of its efficiency
5. Determination of electrical resistivity of metal and alloy –Carey foster Bridge.
6. Measurement of susceptibility of paramagnetic solution by Quinke's method.
7. Study of magnetic Hysteresis-B-H curve.
8. Determination of the dark resistance of light detective resister (LDR).
9. Measurement of Temperature using LM35.

**TOTAL: 30 PERIODS****OUTCOMES:**

At the end of the course, the students should be able

- To understand the functioning of various physics laboratory equipment.
- To use graphical models to analyze the laboratory data and to solve problems individually and collaboratively.
- Use mathematical models as a medium for quantitative reasoning and describing physical reality.
- Access, process and analyze scientific information.
- Solve problems individually and collaboratively

**TEXTBOOKS:**

1. Wilson J.D. and Hernandez C.A., —Physics Laboratory ExperimentsII, Houghton Mifflin Company, New York, 2005.
2. S. Srinivasan, A Text Book of Practical physics, S. Sultan Chand publications. 2005
3. R. Sasikumar, Practical Physics, PHI Learning Pvt. Ltd, New Delhi, 2011.

## CO – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
CON	3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-	-	-

### CHEMISTRY LABORATORY: (Any five experiments to be conducted)

#### OBJECTIVES:

- To train the students in basic experimental skills in water contaminants such as copper and chromium.
- To familiarise the students with electroanalytical techniques such as pH metry, potentiometry, and conductometry to determine impurities in aqueous solutions.
- To familiarize the students with the determination of the molecular weight of a polymer by a viscometer.
- To make the student up-to-date with the properties and nature of alloys experimentally.
- To demonstrate the analysis of coal.

#### LIST OF EXPERIMENTS:

1. Estimation of copper content of the given solution by Iodometry.
2. Determination of strength and amount of acids in a mixture of acids using a conductivity meter.
3. Determination of strength and amount of HCl present in the whole of the given solution using a conductivity meter.
4. Estimation of the iron content of the given solution using a potentiometer.
5. Determination of chromium by EDTA titration.
6. Determination of strength of given hydrochloric acid using a pH meter.
7. Determine the molecular weight of the polyvinyl alcohol using an Ostwald viscometer.
8. Estimation of Nickel in steel.
9. Proximate Analysis of Coal.
10. Corrosion experiment-weight loss method.
11. Determination of COD value of industrial effluents.

**TOTAL: 30 PERIODS**

## OUTCOMES:

At the end of the course, the student should be able:

- To find the quality of water samples for copper and chromium present in water.
- To recognize the amount of various ions present in the water sample through volumetric and instrumentation techniques.
- To identify the molecular weight of the polymer using an Ostwald viscometer.
- To recognize an environmental hazardous and threshold limit for industrial effluents.
- To recommend quality of coal and steel when it is exposed to various environment.

## TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis (8th Edition, 2014).
2. Suchi Tiwari, Engineering Chemistry Lab Manual, Scitech Publications (India) Pvt. Ltd. (2nd Edition, 2013).
3. Pushpendra Kumar, Laboratory Manual for Engineering Chemistry, Reyansh Authortopic Pvt. Ltd., (1st Edition, 2022).

## CO – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
2	2	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
3	2	1	1	1	2	-	-	-	-	-	-	-	-	-	-	-
4	2	2	1	1	1	2	2	2	-	-	-	-	-	-	-	-
5	2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
Avg	2.0	1.4	1.0	1.0	1.2	2.0	2.0	2.0	-	-	-	-	-	-	-	-



## NSS/NSO/YRC & CLUB ACTIVITIES

**Course Code and Title : NSS/NSO/YRC/Club Activities**

### **NATIONAL SERVICE SCHEME (NSS)**

#### **Unit – 1 : NATIONAL SERVICE SCHEME (NSS)**

##### **Objectives:**

The main objectives of this course are:

1. To help learners know about NSS in the context of youth, community and voluntary service.
2. To teach the importance of health, hygiene and sanitation for a healthy Nation.
3. To understand the community in which they work.
4. To identify the problems of the community and involve them in problem-solving.
5. To develop the capacity to meet emergencies and natural disasters.
6. To practice the National integration and social harmony.
7. To utilize their knowledge in finding practical solutions to individual and community

##### **Credit:**

Total Lecture Hours / Semester	Total Tutorial Hours / Semester	Total Practical Hours / Semester	Credit
6	0	18	1*

\* To be conducted after college hours and week ends

##### **Outcome:**

Learners will have the knowledge about NSS and its role in the fields of health, hygiene, emergencies & natural disasters and involve them in problem-solving of the nearest community so as to build a strong country.

##### **Syllabus:**

Semester : I&II

Attendance weightage : 50

Activities weightage : 50

#### **Topic -I : Introduction and Basic Concepts of NSS**

**[8]**

- a. History – Aim – Objectives of NSS
- b. Emblem – Motto – Badge - Song
- c. Organizational structure - Roles and Responsibilities of NSS
- d. Regular activities
- e. Any approved indoor / outdoor programs by the Principal

**Topic-II : Youth Leadership, Social Harmony and National Integration [8]**

- a. Meaning and types of Leadership
- b. Qualities of good leaders and leadership
- c. Importance and role of youth leadership
- d. Role of youth in peace and Nation building
- e. Any approved indoor / outdoor programs by the Principal

**Topic-III : Health, Hygiene and Sanitation and Youth Health [8]**

- a. Definition, Needs and Scope of Health Education
- b. Swachh Bharat Abhiyan
- c. Healthy Lifestyles
- d. HIV, AIDS, Drugs abuse
- e. Any approved indoor / outdoor programs by the Principal

**Topic-IV : Environment Issues, Emergencies and Disaster Management [8]**

- a. Environment conservation, enrichment and sustainability
- b. Waste management
- c. Natural resource management [Rain water harvesting and Energy conservation]
- d. Introduction to Disaster Management, Classification of Disasters
- e. Any approved indoor / outdoor programs by the Principal

**References:**

1. National Service Scheme Manual (Revised) 2006, Government of India, Ministry of Youth Affairs and Sports, New Delhi.
2. National Youth Policy, Government of India, Ministry of Youth Affairs and Sports, New Delhi.
3. <https://nss.gov.in/>

## **YOUTH RED CROSS – SOCIAL SERVICE BASED ACTIVITIES**

### **OBJECTIVES:**

- To enhance the societal awareness
- To upgrade the Personality

### **ACTIVITIES**

**5**

1. **HEALTH PROMOTION-** Activities that promotes health (2)
2. **SOCIETAL SERVICE-**Social Service activities(2)
3. **FRIENDSHIP BUILDING** - Friendship building activities between communities (1)

### **COURSE OUTCOME**

1. Enhanced Social Awareness
2. Personality development of the individual

### **References:**

1. IRCS/YRC Handbook
2. <https://www.indianredcross.org/youth/Guidelines-for-JYRC-LR.pdf>

## NATIONAL SPORTS ORGANIZATION (NSO)

### OBJECTIVES:

- To create awareness about basic fitness and mental strength
- To promote the development of physical fitness
- To develop the sporting activities of the youth
- To create the social responsibilities and social interaction through participation

### ACTIVITIES

5

**INTRODUCTION** - Introduction of NSO & Physical Fitness and games Skills Test (1)

**PHYSICAL FITNESS ACTIVITIES** - Importance of Basic Physical Fitness - BMI Calculation - Identification of deformities, (2)

**SPORTS PRACTICE** - Games and fitness activities Physical Fitness Activities (2)

### COURSE OUTCOMES:

- Get basic knowledge about physical and mental fitness
- NSO create self-esteem and self confidence
- NSO provide opportunity get social interaction
- Development of character and personality through participation

### REFERENCES:

1. [www.google.com](http://www.google.com)
2. <https://scholar.google.com/>
3. <https://www.medindia.net/patients/lifestyleandwellness/five-essential-components-of-physical-fitness-references.htm>
4. <https://pubmed.ncbi.nlm.nih.gov/>

## தமிழ் மன்றம்

### பாடத்திட்டத்தின் நோக்கங்கள்

- மாணவர்களை சிறந்த மேடைப்பேச்சாளர்களாக உருவாக்குவது
- தாய்மொழியின் மேன்மையை பாதுகாப்பது..

### பயிற்சித்திட்டம்

1. பேச்சுக்கலைப் பயிற்சி
2. கவிதை மற்றும் கட்டுரைகள் எழுதும் பயிற்சி
3. அறிவியல் பொறியியல் தொழில்நுட்பங்களைத் தமிழில் எழுதுதல்.
4. பட்டிமன்ற மேடைகளில் பேசும் பயிற்சி.
5. நாட்டுப்புறப்பாடல்கள் பாடுதல் மற்றும் கதைகள் எழுதும் பயிற்சி.

### கற்றல் முடிவு

1. பேச்சுக்கலைப் தேர்ச்சி
2. நாட்டுப்புறப்பாடல்கள் பற்றிய புரிதல்

### மேற்கோள்கள்

1. <https://eegarai.darkbb.com/t63483-topic>
2. <https://poriyari.in/>

## ECLECTIC LINGUA – SKILL BASED ACTIVITIES

### OBJECTIVES:

- To enhance the communicative competence of the first-year engineering students by means of creating opportunity for impromptu/ /spontaneous speeches.
- To upgrade the English language skills of students by introducing appropriate vocabulary in different situations.

### ACTIVITIES

5

1. **Extempore**- Giving expression to thoughts (2)
2. **Building Vocabulary**-Using relevant set of words for different contexts (2)
3. **Pronunciation**- Speaking accurately and fluently (1)

### COURSE OUTCOME

1. To enable students to express themselves easily and coherently.
2. To help students to speak the language using the right words and pronouncing them correctly.

### References

<https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=pronunciation>

<https://www.quillsandquotes.ca/post/12-fun-games-to-get-students-public-speaking>

## GE3251- CATALYSIS CLUB

Catalysis – Skill-based activities

### Objectives:

- To inculcate a scientific attitude and temper.
- To provide an opportunity to develop constructive, explorative & inventive ideas among the students.
- To develop training in the scientific method of problem-solving for engineering

1. **Quiz/debate-** the latest advancement in Chemistry towards engineering (2)
2. **Essay competition/Chart preparation** - Environmental sustainability (2)
3. **Nature Study - field visit to eco-parks etc.** (1)

### COURSE OUTCOME

1. To promote inquisitiveness among the students and inculcate Scientific mind mapping.
2. To develop students, interest and participation in the practical applications of the knowledge related to environmental sciences.
3. Take part in practical, hands-on science activities close to nature.

### REFERENCE

1. M. Senapati, Advanced Engineering Chemistry, Infinity science press, New Delhi, 2007.
2. <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/environmental-sustainability>
3. <https://www.indiabix.com/general-knowledge/chemistry/>

### SEMESTER III

MA3322

DISCRETE MATHEMATICS

L T P C

3 0 0 3

#### OBJECTIVES:

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

#### UNIT-I: LOGICS

9L

Propositional logic – Propositional equivalences – Normal Forms – Rules of inference.

#### UNIT-II: ADVANCED COUNTING PRINCIPLE

9L

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations - Inclusion and exclusion principle and its applications.

#### UNIT-III: GRAPH THEORY

9L

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

#### UNIT-IV: GROUP THEORY

9L

Algebraic systems - Groups – Subgroups – Homomorphism's – Cosets – Lagrange's theorem.

#### UNIT-V: LATTICES AND BOOLEAN ALGEBRA

9L

Partial ordering – Posets – Lattices as Posets – Properties of lattices – Some special lattices – Boolean algebra definition.



**OUTCOMES:**

- Have knowledge of the concepts needed to test the logic of a program.
- Have an understanding in counting principle on many levels.
- To understand the concepts of graphs and its applications in computer science.
- Be exposed to concepts and properties of algebraic structures like groups, subgroups and cosets.
- To understand the concepts of Lattices and Boolean algebra.

**TEXTBOOKS:**

1. Kenneth H. Rosen . Dr. Kamala Krithivasan, "Discrete Mathematics and Its Applications (SIE) | 8th Edition, McGraw Hill, Special Indian Edition, 2021.
2. Tremblay, J.P. and Manohar.R, “Discrete Mathematical Structures with Applications to Computer Science”, McGraw Hill Pub. .Co. Ltd, New Delhi 2017.

**REFERENCE BOOKS:**

1. Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4<sup>th</sup>Edition, Pearson Education Asia, Delhi, 2007.
2. Veerarajan. T, “Discrete Mathematics with graph theory and Combinatorics”, McGraw Hill Publication Pvt Ltd. 2018.
3. Sivarama Krishna Dass.P & Vijayakumari. C “Discrete Mathematics” Person Education, 2020.

Course Outcomes	PROGRAM OUTCOMES												Program Specific Outcomes			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
<b>CO1</b>	3	3	2	-	-	-	-	-	-	-	-	1	-	-	1	-
<b>CO2</b>	3	3	3	-	-	-	-	-	1	-	-	1	-	-	1	-
<b>CO3</b>	3	3	2	-	-	-	-	-	1	-	-	1	-	-	1	-
<b>CO4</b>	3	3	2	-	-	-	-	-	-	-	-	1	-	-	1	-
<b>CO5</b>	3	3	3	-	-	-	-	-	1	-	-	1	-	-	1	-
<b>CON</b>	<b>3</b>	<b>3</b>	<b>2.4</b>	-	-	-	-	-	<b>1</b>	-	-	<b>1</b>	-	-	<b>1</b>	-



## COURSE OUTCOMES:

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

- Design various combinational digital circuits using logic gates
- Design sequential circuits and analyze the design procedures
- State the fundamentals of computer systems and analyze the execution of an instruction
- Analyze different types of control design and identify hazards
- Identify the characteristics of various memory systems and I/O communication.

## TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti, —Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilogll, Sixth Edition, Pearson Education, 2018.
2. David A. Patterson, John L. Hennessy, —Computer Organization and Design, The Hardware/Software Interfacell, Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

## REFERENCES:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, —Computer Organization and Embedded Systemsll, Sixth Edition, Tata McGraw–Hill, 2012.
2. William Stallings, —Computer Organization and Architecture — Designing for Performancell, Tenth Edition, Pearson Education, 2016.
3. M. Morris Mano, —Digital Logic and Computer Designll, Pearson Education, 2016.

## CO's– PO's & PSO's MAPPING

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	-	-	3	2	2	1	1	-	-	-	-	1	-	2	-
2	3	-	3	-	-	-	-	-	1	1	-	-	2	-	-	-
3	-	3	-	-	-	2	-	-	-	1	-	3	1	-	2	-
4	-	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
5	2	-	2	-	-	2	1	-	1	-	-	2	1	-	2	-
Average	2.7	2.5	2.5	2.5	2.0	2.0	1.0	1.0	1.0	1.0	-	2.5	1.5	-	2.0	-

**OBJECTIVES:**

- To introduce the fundamentals of C programming language
- To learn the concepts of Arrays and Pointers in C
- To learn about the basics of data structure
- To know the concepts of linear data structures
- To get familiarize the concepts of non-linear data structures

**UNIT I INTRODUCTION TO C PROGRAMMING 9**

Data Types – Variables – Operations – Expressions and Statements – Conditional Statements – Arrays – Single and Multi-Dimensional Arrays.

**UNIT II ADVANCED CONCEPTS IN C 9**

Functions – Recursive Functions, Parameter Passing Techniques, Pointer – Pointer to Structure, Structures

**UNIT III LINEAR DATA STRUCTURES 9**

Introduction to Data Structures– Abstract Data Types (ADTs) – List ADT – Array-Based Implementation – Linked List – Doubly- Linked Lists – Circular Linked List – Stack ADT – Implementation of Stack – Applications – Queue ADT – Priority Queues – Queue Implementation – Applications.

**UNIT IV NON LINEAR DATA STRUCTURES – TREES 9**

Tree ADT – tree traversals – Binary Tree ADT – expression trees – binary search tree ADT - applications of trees. Implementation of Binary search tree and its operations, tree traversal methods, finding height of the tree using C, AVL Trees.

**UNIT V NON LINEAR DATA STRUCTURES –GRAPHS 9**

Definition – Representation of Graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Dynamic programming Technique – Warshall's and Floyd's algorithm – Greedy method – Dijkstra's algorithm – applications of graphs. Implementation of graph, graph traversal methods, finding shortest path using Dijkstra's algorithm in C.

**TOTAL: 45 PERIODS**

## OUTCOMES:

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

- Develop C programs for any real world or technical problem.
- Apply the advanced features of C in problem solving.
- Apply the different linear data structures to problem solutions.
- Apply the different non-linear data structures to problem solutions.
- Suggest and use appropriate linear/non-linear data structure operations for solving a given problem.

## TEXT BOOKS:

1. E. Balaguruswamy, —Programming in ANSI C++, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0. (Unit-I and Unit-II)
2. Reema Thareja, —Data Structures Using C, Second Edition, Oxford University Press, 2011 (Unit-III, IV and V)

## REFERENCE BOOKS:

1. Pradip Dey, Manas Ghosh, —Programming in C++, 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6. (Unit-I and Unit-II)
2. Aho, Hopcroft and Ullman, —Data Structures and Algorithms, Pearson Education, 1983. (Unit-III, IV and V)
3. Byron Gottfried, Jitender Chhabra, —Programming with C++ (Schaum's Outlines Series), McGraw Hill Higher Ed., 3rd Edition, 2010. (Unit-I and Unit-II)
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, —Fundamentals of Data Structures in C, Second Edition, University Press, 2008. (Unit-III, IV and V)
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, Second Edition, McGraw Hill, 2002 (Unit-III)

## CO's – PO – PSO Mapping

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	2	2	–	–	–	–	–	–	–	–	–	3	2	–	–
CO2	3	3	2	–	–	–	–	–	–	–	–	–	3	2	–	–
CO3	3	3	3	–	–	–	–	–	–	–	–	–	3	2	–	–
CO4	3	3	3	–	–	–	–	–	–	–	–	–	3	2	–	–
CO5	3	3	3	–	–	–	–	–	–	–	–	–	3	2	–	–
CON	3	2.8	2.6	–	–	–	–	–	–	–	–	–	3	2	–	–

**COURSE OBJECTIVES:**

- To understand Object Oriented Programming concepts and basics of Java programming language
- To know the principles of packages, inheritance and interfaces
- To develop a java application with threads and generics classes
- To define exceptions and use I/O streams
- To design and build Graphical User Interface Application using JAVAFX

**UNIT I INTRODUCTION TO OOP AND JAVA 9**

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors – Methods – Access specifiers – Static members – Java Doc comments.

**UNIT II INHERITANCE, PACKAGES AND INTERFACES 9**

Overloading Methods – Objects as Parameters – Returning Objects – Static, Nested and Inner Classes. Inheritance: Basics – Types of Inheritance – Super keyword – Method Overriding – Abstract Classes – final with Inheritance. Packages and Interfaces: Packages and Member Access – Importing Packages – Interfaces.

**UNIT III EXCEPTION HANDLING AND MULTITHREADING 9**

Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model – Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication – Suspending – Resuming, and Stopping Threads – Multithreading.

**UNIT IV I/O, GENERICS, STRING HANDLING 9**

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

## UNIT V          JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS          9

AWT vs Swing Components – JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars –MenuItem.

**TOTAL: 45 PERIODS**

### COURSE OUTCOMES:

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

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

### TEXT BOOKS:

1. Herbert Schildt, —Java: The Complete Referencell, 11 th Edition, McGraw Hill Education,New Delhi, 2019
2. Herbert Schildt, —Introducing JavaFX 8 Programmingll, 1 st Edition, McGraw Hill Education, New Delhi, 2015

### REFERENCE:

Cay S. Horstmann, “Core Java Fundamentals”, Volume 1, 11 th Edition, Prentice Hall, 2018

### CO's– PO's & PSO's MAPPING

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	1	1	3	1	3	–	–	–	3	2	2	2	3	1	2	2
CO2	2	1	3	2	1	–	–	–	2	1	1	3	3	3	2	1
CO3	3	3	1	2	2	–	–	–	3	2	1	2	3	1	3	2
CO4	3	1	2	2	2	–	–	–	1	2	1	3	3	1	1	2
CO5	1	1	2	3	2	–	–	–	3	2	1	2	3	3	3	1
CON	2	1.4	2.2	2	2	–	–	–	2.4	1.8	1.2	2.4	3	1.8	2.2	1.6

**COURSE OBJECTIVES:**

- To understand the data science fundamentals and process.
- To learn to describe the data for the data science process.
- To learn to describe the relationship between data.
- To utilize the Python libraries for Data Wrangling.
- To present and interpret data using visualization libraries in Python.

**UNIT I INTRODUCTION 9**

Data Science: Benefits and uses – facets of data – Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation – Exploratory Data analysis build the model– presenting findings and building applications – Data Mining – Data Warehousing – Basic Statistical descriptions of Data

**UNIT II DESCRIBING DATA 9**

Types of Data – Types of Variables –Describing Data with Tables and Graphs – Describing Data with Averages – Describing Variability – Normal Distributions and Standard (z) Scores.

**UNIT III DESCRIBING RELATIONSHIPS 9**

Correlation –Scatter plots –correlation coefficient for quantitative data – computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of estimate – interpretation of  $r^2$  –multiple regression equations – regression towards the mean

**UNIT IV PYTHON LIBRARIES FOR DATA WRANGLING 9**

Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables



**UNIT V DATA VISUALIZATION****9**

Importing Matplotlib – Line plots – Scatter plots – visualizing errors – density and contour plots – Histograms – legends – colors – subplots – text and annotation – customization – three dimensional plotting – Geographic Data with Basemap – Visualization with Seaborn.

**TOTAL: 45 PERIODS****COURSE OUTCOMES:****At the end of this course, the students will be able to:**

- Define the data science process.
- Understand different types of data description for data science process.
- Gain knowledge on relationships between data.
- Use the Python Libraries for Data Wrangling.
- Apply visualization Libraries in Python to interpret and explore data.

**TEXT BOOKS:**

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, —Introducing Data Sciencell, Manning Publications, 2016. (Unit I)
2. Robert S. Witte and John S. Witte, —Statistics II, Eleventh Edition, Wiley Publications, 2017. (Units II and III)
3. Jake VanderPlas, —Python Data Science HandbookII, O'Reilly, 2016. (Units IV and V)

**REFERENCES:**

1. Allen B. Downey, —Think Stats: Exploratory Data Analysis in PythonII, Green Tea Press, 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	12	1	2	3	4
CO1	2	2	1	2	2	–	–	–	1	1	1	2	2	2	2	2
CO2	2	1	–	1	1	–	–	–	2	1	1	2	2	3	1	1
CO3	2	2	1	2	2	1	1	–	1	2	1	3	2	2	3	2
CO4	3	2	2	1	2	–	–	–	1	1	2	2	3	3	2	1
CO5	2	2	1	2	2	–	–	–	1	1	1	2	2	2	2	2
CON	2.2	1.8	1.2	1.6	1.8	1	1	–	1.2	1.2	1.2	2.2	2.2	2.4	2.0	1.6

**COURSE OBJECTIVES**

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering
- To Understand Analysis Modelling.
- To understand the various software design methodologies.
- To learn various testing and maintenance measures.

**UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9**

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility–Agile process–Extreme programming–XP Process– Quality management–SQA–SQA plan

**UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9**

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

**UNIT III SOFTWARE DESIGN 9**

Design process – Design Concepts–Design Model– Design Heuristic – Architectural Design

– Architectural styles, Architectural Design, Architectural Mapping using Data Flow– User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

**UNIT IV TESTING AND MAINTENANCE 9**

Software testing fundamentals–Internal and external views of Testing–white box testing – basis path testing–control structure testing–black box testing– Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing and Debugging – Software Implementation Techniques: Coding practices–Refactoring– Maintenance and Reengineering–BPR model–Reengineering process model– Reverse and Forward Engineering.

## **UNIT V PROJECT MANAGEMENT**

**9**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection – Risk Management–Risk Identification–RMMM Plan–CASE TOOLS

**TOTAL: 45 PERIODS**

### **COURSE OUTCOMES**

On Completion of the course, the students should be able to:

- Identify the key activities in managing a software project, project schedule, estimate project cost and effort required.
- Compare different process models.
- Concepts of requirements engineering and Analysis Modeling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.

### **TEXT BOOKS:**

1. Roger S. Pressman,—Software Engineering– A Practitioner’s Approachll, SeventhEdition, Mc Graw–Hill International Edition, 2010.
2. Ian Sommerville,—SoftwareEngineeringll,9th Edition, Pearson Education Asia,2011.

### **REFERENCE BOOKS:**

1. Rajib Mall, —Fundamentals of Software Engineeringll, Third Edition, PHI LearningPvt Limited, 2009.
2. Pankaj Jalote, —Software Engineering, A Precise Approachll, Wiley India, 2010.
3. Kelkar S.A., —Software Engineeringll, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, —Software Engineeringll, Tata McGraw–Hill Publishing CompanyLimited,2007.
5. <http://nptel.ac.in/>.

**CO's– PO's & PSO's MAPPING**

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
<b>CO1</b>	2	–	3	3	–	–	–	–	–	–	–	2	2	–	–	–
<b>CO2</b>	2	–	3	3	–	2	–	–	–	–	–	–	–	2	–	–
<b>CO3</b>	–	–	3	3	–	–	–	–	–	–	3	–	–	–	2	–
<b>CO4</b>	–	2	–	–	–	–	–	–	–	2	–	–	–	2	–	–
<b>CO5</b>	–	2	–	–	–	3	–	–	–	–	3	–	–	–	1	–
<b>CON</b>	2	2	3	3	–	2.5	–	–	–	2	3	3	2	2	1.5	–

**OBJECTIVES:**

- To develop C programs using basic constructs.
- To implement Linear Data Structures.
- To implement Non–Linear Data Structures.
- To implement Tree Traversal Algorithms.
- To implement Graph Traversal Algorithms.

**LIST OF EXPERIMENTS:**

1. Implement C program using I/O Statements, Operators and Expressions
2. a. Decision–making constructs: if–else, goto, switch–case, break–continue  
b. Loops: for, while, do–while
3. Arrays: 1D and 2D, Multi–dimensional arrays, traversal
4. Array implementation of Stack, Queue and Circular Queue ADTs
5. Implementation of Singly Linked List
6. Linked list implementation of Stack and Linear Queue ADTs
7. Implementation of Polynomial Manipulation using Linked list
8. Implementation of Evaluating Postfix Expressions, Infix to Postfix conversion
9. Implementation of Binary Search Trees
10. Implementation of Tree Traversal Algorithms
11. Implementation Graph Traversal Algorithms
12. Implementation of Dijkstra’s Algorithm

**TOTAL: 45 PERIODS****Operating Systems: Linux / Windows****Software: C language****OUTCOMES:****At the end of the course, the student should be able to:**

- Develop C programs for real world problems
- Implement Linear Data Structures and its applications.
- Implement Non–Linear Data Structures and its applications.
- Implement Binary Search tree operations.
- Implement graph algorithms.

## CO's– PO's & PSO's MAPPING

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	-	-	-	2	-	-	-	-	-	-	-	3	2	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	-	3	2	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-
CO5	3	3	3	-	2	-	-	-	-	-	-	-	3	2	-	-
CON	2.6	2.3	3	-	2	-	-	-	-	-	-	-	3	2	-	-

**COURSE OBJECTIVES:**

- To build software development skills using java programming for real–world applications.
- To understand and apply the concepts of classes and objects
- To build packages, interfaces and inheritance.
- To implement exception handling and file processing.
- To develop applications using generic programming and event handling

**LIST OF EXPERIMENTS:**

1. Solve problems by using sequential search, binary search, and quadratic sorting algorithms (selection, insertion)
2. Develop stack and queue data structures using classes and objects.
3. Develop a java application with an Employee class with Emp\_name, Emp\_id, Address, Mail\_id, Mobile\_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club funds. Generate pay slips for the employees with their gross and net salary.
4. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea( ) that prints the area of the given shape.
5. Solve the above problem using an interface.
6. Implement exception handling and creation of user defined exceptions.
7. Write a java program that implements a multi–threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.
8. Write a program to perform file operations.
9. Develop applications to demonstrate the features of generics classes.
10. Develop applications using Swing and JavaFX controls, layouts and menus.
11. Develop a mini project for any application using Java concepts.

**Lab Requirements:** for a batch of 30 students  
**Operating Systems:** Linux / Windows  
**Front End Tools:** Eclipse IDE / Netbeans IDE

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

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

- Design and develop java programs using object oriented programming concepts.
- Develop simple applications using object oriented concepts such as package, exceptions
- Implement multithreading, and generics concepts
- Create GUIs and event driven programming applications for real world problems
- Implement and deploy web applications using Java

**CO's– PO's & PSO's MAPPING**

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	1	2	1	–	–	–	–	1	2	2	2	1	2	3	2
CO2	2	1	3	1	–	–	–	–	2	3	3	2	1	3	1	2
CO3	2	2	1	2	1	–	–	–	1	2	1	3	2	3	2	1
CO4	2	2	1	3	–	–	–	–	3	1	1	1	2	1	2	1
CO5	1	3	3	1	3	–	–	–	1	1	1	1	2	1	2	2
CON	1.8	1.8	2.0	1.6	2.0	–	–	–	1.6	1.8	1.6	1.8	1.6	2	2	1.6



**COURSE OBJECTIVES:**

- To understand the python libraries for data science
- To understand the basic Statistical and Probability measures for data science.
- To learn descriptive analytics on the benchmark data sets.
- To apply correlation and regression analytics on standard data sets.
- To present and interpret data using visualization packages in Python.

**LIST OF EXPERIMENTS:**

1. Download, install and explore the features of NumPy, SciPy, Jupyter, Statsmodels and Pandas packages.
2. Working with Numpy arrays
3. Working with Pandas data frames
4. Reading data from text files, Excel and the web and exploring various commands for doing descriptive analytics on the Iris data set.
5. Use the diabetes data set from UCI and Pima Indians Diabetes data set for performing the following:
  - a. Univariate analysis: Frequency, Mean, Median, Mode, Variance, Standard Deviation, Skewness and Kurtosis.
  - b. Bivariate analysis: Linear and logistic regression modeling
  - c. Multiple Regression analysis
  - d. Also compare the results of the above analysis for the two data sets.
6. Apply and explore various plotting functions on UCI data sets.
  - a. Normal curves
  - b. Density and contour plots
  - c. Correlation and scatter plots
  - d. Histograms
  - e. Three dimensional plotting
7. Visualizing Geographic Data with Basemap

## LIST OF EQUIPMENTS: (30 Students per Batch)

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

Note: Example data sets like: UCI, Iris, Pima Indians Diabetes etc.

**TOTAL: 45 PERIODS**

## COURSE OUTCOMES:

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

- Make use of the pythonlibraries for data science
- Make use of the basic Statistical and Probability measures for data science.
- Perform descriptive analytics on the benchmark data sets.
- Perform correlation and regression analytics on standard data sets
- Present and interpret data using visualization packages in Python.

## CO's– PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1	1	–	–	–	–	1	3	3	3	1	3	2
CO2	3	2	2	3	1	–	–	–	3	1	3	2	1	3	3
CO3	3	2	1	3	1	–	–	–	2	1	1	1	3	2	3
CO4	2	3	1	3	–	–	–	–	2	3	2	3	3	3	1
CO5	1	2	3	1	1	–	–	–	2	1	3	1	1	3	3
CON	2.4	2.2	1.6	2.2	1	–	–	–	2.0	1.8	2.4	2.0	1.8	2.8	2.4

## SEMESTER IV

**MA3422 APPLIED MATHEMATICS FOR INFORMATION SCIENCE L T P C**  
**2 0 0 2**

### OBJECTIVES:

- To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.
- To introduce and apply the concepts of rings, finite fields and polynomials.
- To understand the basic concepts in number theory
- To examine the key questions in the Theory of Numbers.
- To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

### **UNIT-I: GROUPS AND RINGS 6L**

Algebra: groups, rings, fields, finite fields – definitions-examples – properties

### **UNIT-II: FINITE FIELDS AND POLYNOMIALS 6L**

Rings - Polynomial rings - Irreducible polynomials over finite fields - Factorization of polynomials over finite fields.

### **UNIT-III: ANALYTIC NUMBER THEORY 6L**

Division algorithm – Prime and composite numbers – GCD – Euclidean algorithm – LCM.

### **UNIT-IV: DIOPHANTINE EQUATIONS AND CONGRUENCES 6L**

Linear Diophantine equations – Congruence's – Linear Congruence's - Modular exponentiation-Chinese remainder theorem

### **UNIT-V: CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS 6L**

Wilson's theorem – Fermat's little theorem – Euler's theorem – statements- examples- Euler's Phi functions – Tau and Sigma functions. (Statement only)

**TOTAL: 30L PERIODS**

## OUTCOMES:

- Apply the basic notions of groups, rings, fields which will then be used to solve related problems.
- Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- Demonstrate accurate and efficient use of advanced algebraic techniques.
- Demonstrate their mastery by solving non - trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text.
- Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

## TEXTBOOKS:

1. Grimaldi, R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics", Pearson Education, 5th Edition, New Delhi, 2007.
2. Koshy, T., —Elementary Number Theory with ApplicationsII, Elsevier Publications, New Delhi, 2002.

## REFERENCES:

1. Lidl, R. and Pitz, G, "Applied Abstract Algebra", Springer Verlag, New Delhi, 2nd Edition, 2006.
2. Niven, I., Zuckerman.H.S., and Montgomery, H.L., —An Introduction to Theory of NumbersII, John Wiley and Sons, Singapore, 2004.
3. San Ling and Chaoping Xing, —Coding Theory – A first CourseII, Cambridge Publications, Cambridge, 2004.

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	3	3	-	-	-	-	-	1	1	-	1	-	-	1	-
CO2	3	3	3	-	-	-	-	-	1	1	-	1	-	-	1	-
CO3	3	3	3	-	-	-	-	-	1	1	-	1	-	-	1	-
CO4	3	3	3	-	-	-	-	-	1	1	-	1	-	-	1	-
CO5	3	3	3	-	-	-	-	-	1	1	-	1	-	-	1	-
CON	3	3	3	-	-	-	-	-	1	1	-	1	-	-	1	-



## COURSE OUTCOMES:

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

- Explain Automata concepts, Automata and complexity and to adopt a suitable process for finite automata
- Important structural representations other than automata
- Analyze the different types of proofs such as deductive, inductive, proof by contradiction and proof by counter examples
- Difference between DFA and NFA and central concepts of automata theory
- Identify the Difference between Finite automata and Regular Expressions

## TEXT BOOKS:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, – Introduction to Automata Theory, Languages and Computations, Third Edition, Pearson Education, 2008.

## REFERENCE BOOKS:

1. H.R.Lewis and C.H.Papadimitriou, Elements of the theory of Computation, Second Edition, PHI, 2003.
2. J.Martin, Introduction to Languages and the Theory of Computation, Third Edition, TMH, 2003.
3. Micheal Sipser, Introduction of the Theory and Computation, Thomson Brokecole, 1997.

## CO's– PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	3	2	3	–	–	–	–	1	1	2	3	1	3	2
2	2	2	3	2	1	–	–	–	3	3	2	3	3	1	2
3	2	2	3	2	1	–	–	–	1	3	1	2	1	2	2
4	2	2	2	1	–	–	–	–	1	3	3	2	1	3	2
5	2	2	2	1	1	–	–	–	1	1	3	2	3	1	3
AVg.	1.8	2.2	2.4	1.8	1	–	–	–	1.4	2.2	2.2	2.4	1.8	2	2.2

**COURSE OBJECTIVES:**

- To understand the fundamentals of object modelling and differentiate Unified Process from other approaches.
- To Understand the Agile methods
- To design with static UML diagrams.
- To design with the UML dynamic and implementation diagrams.
- To improve the software design with design patterns.
- To test the software against its requirements specification

**UNIT I UNIFIED PROCESS AND USE CASE DIAGRAMS 9**

Introduction to OOAD with OO Basics – What is the UML? – Iterative, Evaluatory and Agile – Agile methods and attitudes– Agile modeling– Unified Process – Inception and Use cases –Use cases and the Use case model–Applying UML–Use case diagrams– Relating Use cases – include, extend and generalization – When to use Use-cases.

**UNIT II ELABORATION & UML DIAGRAMS 9**

Elaboration – UML Class diagram–Domain Model – Finding conceptual classes and description classes – Associations – Attributes – System sequence diagram – Logical Architecture and UML Package diagram – UML interaction diagram – Sequence diagram–Communication diagram.

**UNIT III APPLYING UML & IMPLEMENTATION UML DIAGRAMS 9**

Activity diagram – When to use activity diagrams – State machine diagram and Modelling–When to use State Diagrams – Implementation Diagrams – Component and Deployment Diagrams – When to use Component and Deployment diagrams– Mapping Design to code

**UNIT IV DESIGN PATTERNS AND METHODOLOGY 9**

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioural – Strategy – observer –Mapping design to code – Applying GoF design patterns.

Object Oriented Methodologies – Software Quality Assurance – Impact of object orientation on Testing – Test driven development and Agile concepts – Documenting Architecture – Case study– Next Gen PoS system– Monopoly Game.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

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

- Express software design with UML diagrams
- Design software applications using OO concepts.
- Identify various scenarios based on software requirements
- Transform UML based software design into pattern based design using design patterns Create code from design.

**TEXT BOOKS:**

1. Craig Larman, —Applying UML and Patterns: An Introduction to Object–Oriented Analysis and Design and Iterative Developmentll, Third Edition, Pearson Education, 2016.
2. Ali Bahrami – Object Oriented Systems Development – McGraw Hill International Edition – 1999.

**REFERENCE BOOKS:**

1. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, —Design patterns: Elements of Reusable Object–Oriented Software, Addison–Wesley, 1995.
2. Martin Fowler, —UML Distilled: A Brief Guide to the Standard Object Modeling Language, Third edition, Addison Wesley, 2003.

**CO’s– PO’s & PSO’s MAPPING**

CO’s	PO’s												PSO’s			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	–	2	3	–	–	–	–	–	3	–	2	1	–	–	–
CO2	–	–	3	3	–	–	–	–	–	–	–	1	–	2	–	–
CO3	1	–	3	3	–	–	–	–	–	2	–	–	–	–	1	–
CO4	–	2	–	–	–	3	3	–	–	2	–	–	–	1	–	–
CO5	–	–	–	–	2	3	3	–	–	1	–	–	–	–	1	–
CON	1.5	2.0	2.6	3.0	2.0	3.0	3.0	–	–	2	–	1.5	1.0	1.5	1	–



**COURSE OBJECTIVES:**

- To learn the fundamentals of data models, relational algebra and SQL
- To represent a database system using ER diagrams and to learn normalization techniques
- To understand the fundamental concepts of transaction, concurrency and recovery processing
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
- To have an introductory knowledge about the Distributed databases, NOSQL and database security

**UNIT I INTRODUCTION TO DATABASES AND SQL 9**

Purpose of Database System — View of data — Database and Application Architecture — Database Administrator — Introduction to Relational model — Structure of Relational Database — Database Schema — Keys — Schema diagram — Introduction to SQL — SQL Data Definition — basic Structure of SQL Queries — Additional Basic operation — Set operation — Null Values — Aggregate Function — Modification of the Database — Intermediate SQL — Join operation — Transactions — Integrity constraints — Trigger.

**UNIT II DATABASE DESIGN 9**

Entity–Relationship model — E–R Diagrams — Enhanced–ER Model — ER–to–Relational Mapping — Functional Dependencies — Non–loss Decomposition — First, Second, Third Normal Forms, Dependency Preservation — Boyce/Codd Normal Form — Multi–valued Dependencies and Fourth Normal Form — Join Dependencies and Fifth Normal Form.

**UNIT III TRANSACTION AND CONCURRENCY CONTROL 9**

Transaction Concepts — ACID Properties — simple transaction model — Transaction Atomicity and Durability — Transaction Isolation — Serializability — Transaction Isolation and Atomicity — Concurrency Control — Lock based protocols — Locking Protocols — Two Phase Locking — Deadlock — prevention — Deadlock Detection and Recovery — Multiple Granularity — Timestamp–Based Protocols.

**UNIT IV IMPLEMENTATION TECHNIQUES****9**

RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview .– Algorithms for SELECT and JOIN operations

**UNIT V ADVANCED TOPICS****9**

Distributed Databases: Architecture, Data Storage— Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL — XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery — Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

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

- Describe the fundamental elements of relational database management systems
- Apply ER model and Relational model to perform database design effectively
- Apply and relate the concept of transaction, concurrency control and recovery in database.
- Compare and contrast various indexing strategies in different database systems
- Recognize how advanced databases differ from traditional databases.

**TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Database System Concepts, Sixth Edition, Tata McGraw Hill, 2016
2. Ramez Elmasri, Shamkant B. Navathe,— Fundamentals of Database Systems, Sixth Edition, Pearson, 2016.

**REFERENCE BOOKS:**

1. C. J. Date, A.Kannan, S. Swamynathan, – An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.G.K.Gupta, "Database Management Systems, Tata McGraw Hill, 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	12	1	2	3
CO1	2	2	3	2	1	–	–	–	2	1	1	1	2	1	3
CO2	3	1	1	1	1	–	–	–	2	3	3	3	3	1	2
CO3	3	2	3	2	1	–	–	–	2	1	1	2	2	3	3
CO4	1	2	3	2	–	–	–	–	3	2	3	3	1	2	3
CO5	1	1	3	3	2	–	–	–	1	3	3	1	2	2	2
CON	2.0	1.6	2.6	2	1.2	–	–	–	2	2	2.2	2	2	1.8	2.6

**Course Description:**

This course helps to create analytical skills, to enable the students to design algorithms for various applications, and to analyze the algorithms

**COURSE OBJECTIVES:**

- To understand and apply the algorithm analysis techniques on searching and sorting Algorithms
- To critically analyze the efficiency of graph algorithms
- To understand different algorithm design techniques
- To solve programming problems using state space tree
- To understand the concepts behind NP Completeness, Approximation algorithms and randomized algorithms.

**UNIT I INTRODUCTION 9**

Algorithm analysis: Time and space complexity – Asymptotic Notations and its properties Best case, Worst case and average case analysis — Recurrence relation: substitution method — Lower bounds — searching: linear search, binary search and Interpolation Search, Pattern search: The naïve string–matching algorithm – Rabin–Karp algorithm – Knuth–Morris–Pratt algorithm. Sorting: Insertion sort – heap sort

**UNIT II GRAPH ALGORITHMS 9**

Graph algorithms: Representations of graphs – Graph traversal: DFS – BFS – applications– Connectivity, strong connectivity, bi–connectivity – Minimum spanning tree: Kruskal’s and Prim’s algorithm– Shortest path: Bellman–Ford algorithm – Dijkstra’s algorithm – Floyd– Warshall algorithm Network flow: Flow networks – Ford–Fulkerson method — Matching: Maximum bipartite matching

**UNIT III ALGORITHM DESIGN TECHNIQUES 9**

Divide and Conquer methodology: Finding maximum and minimum – Merge sort – Quick sort Dynamic programming: Elements of dynamic programming – Matrix–chain multiplication — Multi stage graph – Optimal Binary Search Trees. Greedy Technique: Elements of the greedy strategy – Activity–selection problem – Optimal Merge pattern – Huffman Trees.

## UNIT IV STATE SPACE SEARCH ALGORITHMS

9

Backtracking: n-Queens problem – Hamiltonian Circuit Problem – Subset Sum Problem – Graph colouring problem Branch and Bound: Solving 15-Puzzle problem – Assignment problem – Knapsack Problem – Travelling Salesman Problem

## UNIT V NP-COMPLETE AND APPROXIMATION ALGORITHM

9

Tractable and intractable problems: Polynomial time algorithms — Venn diagram representation – NP-algorithms – NP-hardness and NP-completeness — Bin Packing problem – Problem reduction: TSP – 3-CNF problem. Approximation Algorithms: TSP – Randomized Algorithms: concept and application – primality testing – randomized quick sort – Finding kth smallest number

### OUTCOMES:

- At the end of this course, the students will be able to:
- Analyze the efficiency of algorithms using various frameworks
- Apply graph algorithms to solve problems and analyze their efficiency.
- Make use of algorithm design techniques like divide and conquer, dynamic programming and greedy techniques to solve problems
- Use the state space tree method for solving problems.
- Solve problems using approximation algorithms and randomized algorithms

### TEXT BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3rd Edition, Prentice Hall of India, 2009.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran—Computer Algorithms/C++|| Orient Blackswan, 2nd Edition, 2019.

### REFERENCES:

1. Anany Levitin, —Introduction to the Design and Analysis of Algorithms||, 3rd Edition, Pearson Education, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Reprint Edition, Pearson Education, 2006.
3. S. Sridhar, —Design and Analysis of Algorithms||, Oxford university press, 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	12	1	2	3
CO1	2	1	3	2	–	–	–	–	2	1	2	3	2	1	1
CO2	2	1	1	1	1	–	–	–	1	3	3	3	2	3	3
CO3	1	3	3	3	1	–	–	–	1	2	1	2	2	1	2
CO4	1	2	2	3	–	–	–	–	2	3	3	1	3	1	3
CO5	1	2	3	2	3	–	–	–	3	1	3	3	1	3	3
CON	1.4	1.8	2.4	2.2	1.6	–	–	–	1.8	2	2.4	2.4	2	1.8	2.4

**OBJECTIVES**

- To learn the basic concepts and functions of operating systems.
- To analyze scheduling algorithms and Deadlock.
- To analyze various memory management schemes.
- To be familiar with I/O management and file systems.
- To be familiar with Mobile OS and Linux OS.

**UNIT I INTRODUCTION 9**

Introduction to Operating System: Operating System Operations– Operating System Structures: Operating System–Services – User Operating System Interface – System Calls – System programs – Operating System Structure (monolithic, layered, modular, micro–kernel models).

**UNIT II PROCESS MANAGEMENT 9**

Processes – Process Concept – Process Scheduling – Operations on Processes – Inter– process Communication; CPU Scheduling – Scheduling criteria – Scheduling algorithms: Process Synchronization – The Critical–Section problem –Semaphores, Deadlock – Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock

**UNIT III MEMORY MANAGEMENT 9**

Main Memory: Swapping– Contiguous Memory Allocation – Paging – Structure of the PageTable – Segmentation, Virtual Memory – Demand Paging – Copy on Write – Page Replacement – Allocation of Frames –Thrashing.

**UNIT IV STORAGE MANAGEMENT 9**

File–System Interface –File concept – Access methods – Directory Structure – Protection. –File System Implementation – File System Structure – File System Operations – Directory implementation – Allocation Methods – Free Space Management; Mass Storage system – Disk Structure – Disk Scheduling –Disk Management– Swap–Space Management.

## **UNIT V MOBILE OS AND CASE STUDIES**

**9**

Mobile OS – iOS and Android. The Linux System: Design Principles–Kernel Modules–Process Management–Scheduling–Memory Management–File Systems – Input and Output– Inter process communication

**TOTAL: 45 PERIODS**

### **OUTCOMES:**

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

- Analyze various main concepts, key ideas, strengths and limitations of operating systems.
- Design various scheduling algorithms.
- Design and implement memory management schemes
- Understand various file management systems
- Understand the Mobile OS and Linux.

### **TEXT BOOKS:**

1. Silberschatz Abraham, Greg Gagne, Peter B. Galvin. —Operating System Concepts II, Ninth Edition, Wiley, 2014. (Unit–I–V)
2. Andrew S Tanenbaum, Modern Operating Systems, Pearson, 5th Edition, 2022 New Delhi. (Unit–II, III, IV).

### **REFERENCE BOOKS:**

1. Ramaz Elmasri, A. Gil Carrick, David Levine, — Operating Systems – A Spiral Approach II, Tata McGraw Hill Edition, 2010.
2. William Stallings, Operating Systems: Internals and Design Principles , 7th Edition, Prentice Hall, 2018
3. Achyut S. Godbole, Atul Kahate, —Operating Systems II, 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	12	1	2	3	4
CO1	3	1	2	2	–	–	–	–	–	–	–	–	–	2	–	–
CO2	2	2	3	1	–	–	–	–	–	–	–	–	–	2	–	–
CO3	1	3	2	2	1	–	–	–	–	–	–	–	–	2	–	–
CO4	1	3	3	3	–	–	–	–	–	–	–	–	–	2	–	–
CO5	3	1	2	1	1	–	–	–	–	–	–	–	–	2	–	–
CON	2	2	2.4	1.8	1	–	–	–	–	–	–	–	–	2	–	–

**OBJECTIVES:**

- To understand the basics of UNIX command and shell programming.
- To implement various CPU scheduling algorithms.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms
- To implement various memory allocation methods and File Organization and File Allocation Strategies.

**LIST OF EXPERIMENTS:**

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

**TOTAL: 45 PERIODS**

**SOFTWARE REQUIREMENTS:**

Standalone desktops with C / C++ / Java / Equivalent compiler 30 Nos. (or) Server with C / C++ / Java / Equivalent compiler supporting 30 terminals or more

**COURSE OUTCOMES:**

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

- Define and implement UNIX Commands.
- Compare the performance of various CPU Scheduling Algorithms.
- Compare and contrast various Memory Allocation Methods.
- Define File Organization and File Allocation Strategies.
- Implement various Disk Scheduling Algorithms

**CO's– PO's & PSO's MAPPING**

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	3	1	3	1	1	–	–	–	–	–	–	–	–	2	–	–
CO2	3	1	1	2	2	–	–	–	–	–	–	–	–	2	–	–
CO3	3	3	2	1	2	–	–	–	–	–	–	–	–	2	–	–
CO4	1	2	2	3	2	–	–	–	–	–	–	–	–	2	–	–
CO5	2	2	1	1	3	–	–	–	–	–	–	–	–	2	–	–
CON	2.4	1.8	1.8	1.6	2	–	–	–	–	–	–	–	–	2	–	–

**COURSE OBJECTIVES:**

The student should be made to:

- To capture the requirements specification for an intended software system
- To draw the UML diagrams for the given specification
- To map the design properly to code
- To test the software system thoroughly for all scenarios
- To improve the design by applying appropriate design patterns.

**LIST OF EXPERIMENTS****UML DESIGN**

1. To develop a problem statement.
2. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer

Suggested domains for Mini–Project (any 3 can done):

1. Passport automation system.
2. Exam Registration
3. Stock maintenance system.
4. Online course reservation system
5. Software personnel management system
6. Recruitment system
7. Conference Management System
8. BPO Management System
9. Library Management System

## COURSE OUTCOMES:

At the end of the course, the student should be able to

- Perform OO analysis and design for a given problem specification.
- Identify and map basic software requirements in UML mapping.
- Use the UML analysis and design diagrams.
- Improve the software quality using design patterns and to explain the rationale behind applying specific design patterns
- Create code from design

## HARDWARE REQUIREMENTS

Standard PC

## SOFTWARE REQUIREMENTS

1. Windows 7 or higher
2. ArgoUML that supports UML 1.4 and higher
3. Selenium, JUnit or Apache JMeter

## CO's– PO's & PSO's MAPPING

CO's	PO's												PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO1	2	2	–	–	–	–	–	–	1	3	–	2	3	–	–	–
CO2	3	–	2	–	1	–	–	–	–	–	–	–	–	–	3	–
CO3	2	–	1	2	–	–	–	–	–	–	2	–	–	–	2	–
CO4	–	–	–	–	1	2	–	–	–	–	–	–	–	2	–	2
CO5	–	–	–	–	–	–	2	2	–	–	–	–	–	–	3	2
CON	2.3	2	1.5	2	1	2	2	2	1	3	2	2	3	2	2.6	2

**COURSE OBJECTIVES:**

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand design and implementation of typical database applications.
- To be familiar with the use of a front end tool for GUI based application development.

**LIST OF EXPERIMENTS:**

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
  2. Create a set of tables, add foreign key constraints and incorporate referential integrity.
  3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
  4. Query the database tables and explore sub queries and simple join operations.
  5. Query the database tables and explore natural, equi and outer joins.
  6. Write user defined functions and stored procedures in SQL.
  7. Execute complex transactions and realize DCL and TCL commands.
  8. Write SQL Triggers for insert, delete, and update operations in a database table.
  9. Create View and index for database tables with a large number of records.
  10. Case Study using any of the real life database applications from the following list
    - a) Inventory Management for a EMart Grocery Shop
    - b) Society Financial Management
    - c) Cop Friendly App – Eseva
    - d) Property Management – eMall
    - e) Star Small and Medium Banking and Finance
- Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application.
  - Apply Normalization rules in designing the tables in scope.
  - Prepared applicable views, triggers (for auditing purposes), and functions for Enabling enterprise grade features.

**TOTAL: 45 PERIODS**

## SOFTWARE Requirements:

Systems with MySql, Visual Studio, Systems with Oracle 11g Client

## COURSE OUTCOMES:

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

- Create databases with different types of key constraints.
- Construct simple and complex SQL queries using DML and DCL commands.
- Use advanced features such as stored procedures
- Create a trigger for the database.
- Create and manipulate database application.

## CO's– PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	–	–	–	–	3	1	3	2	2	3	2
CO2	2	2	3	2	2	–	–	–	1	2	3	3	2	1	2
CO3	3	3	2	1	1	–	–	–	1	1	1	3	2	3	3
CO4	1	3	3	3	1	–	–	–	1	1	3	2	3	1	3
CO5	3	2	1	1	1	–	–	–	2	2	3	1	3	1	2
CON	2.4	2.6	2.4	2	1.2	–	–	–	1.6	1.4	2.6	2.2	2.4	1.8	2.4

**Objective:**

- To know the basic structure of NCC and Role of NCC
- To improve the cadet's personality skill and leadership quality
- To make the interest of cadets to involve in social activities
- Preventing the potential damage and suffering
- to destruction of the enemy's ability to fight and will to fight

**Unit I Introduction to NCC 9**

Aims, Objectives & Organization of NCC, Incentives, Duties of NCC Cadet, NCC Camps and Types National Integration: Importance & Necessity, Factors Affecting National Integration, Unity in Diversity & Role of NCC in Nation Building, Threats to National Security.

**Unit II Personality Development 9**

Personal Transformation, Personal Productivity Skills - time management, organizational and planning skills, problem solving and decision-making abilities, basics of psychology, Leadership, Meditation

**Unit III Social Service and Community Development 9**

Basics, Rural Development Programmes, NGOs, Contribution of Youth, Protection of Children and Women Safety, Road / Rail Travel Safety, New Initiatives, Cyber and Mobile Security Awareness

**Unit IV Disaster Managements and its Awareness 9**

Importance of Hazards and Disaster, Types of disasters, Earthquakes and its types, flood types and its management, landside and its managements case studies of disasters in Sikkim, Training and drills for disaster preparedness, Awareness generation program, Usages of GIS and Remote sensing techniques in disaster management

**Unit V War and Peace in Contemporary World 9**

Conceptual framework of War and Peace, Concepts of theories and approaches, Modern /war fare: Conventional, nuclear, Guerilla and Irregular Warfare, Limited and Specialized Warfare with reference to mountain, desert and jungle warfare, terrorism as a new mode of conflict, War as an Economic Problem, Defence and Development, Defence and Development, Defence and Development

**TOTAL: 45 PERIODS**



**Note:** NCC Credit Course Level – I is offered for NCC students only. The grades earned by the students will be recorded in the marksheet, however the same shall not be considered for the computation of CGPA

**Course outcome:**

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

- Understand their roles and responsibilities
- Demonstrate the knowledge of human values and morals
- Actively participate in social service and development activities
- Understand the importance of disaster management
- Analyse the issues related to war and its effects.

**Text Books**

1. R. Gupta's NCC Handbook of NCC Cadets 'A', 'B' and 'C' certificate Examinations

**Reference book:**

1. V. B. RAO, Personality Development and Soft Skills, BS Publications
2. Harish K. Gupta, Disaster Management, Universities press.