

SRM VALLIAMMAI ENGINEERING COLLEGE

(AN AUTONOMOUS INSTITUTION)

SRM Nagar, Kattankulathur - 603203.

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



DEPARTMENT OF INFORMATION TECHNOLOGY

Under Graduate

CURRICULA AND SYLLABI

REGULATION 2023

SRM VALLIAMMAI ENGINEERING COLLEGE

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

B.TECH. INFORMATION TECHNOLOGY

REGULATIONS – 2023

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

1. To afford the necessary background in the field of Information Technology to deal with engineering problems to excel as engineering professionals in industries.
2. To improve the qualities like creativity, leadership, teamwork and skill thus contributing towards the growth and development of society.
3. To develop ability among students towards innovation and entrepreneurship that caters to the needs of Industry and society.
4. To inculcate and attitude for life-long learning process through the use of information technology sources.
5. To prepare them to be innovative and ethical leaders, both in their chosen profession and in other activities.

2. PROGRAMME OUTCOMES (POs):

After going through the four years of study, Bachelor of Technology in Information Technology Graduates will exhibit ability to:

PO#	Graduate Attribute	Programme Outcome
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the Solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions	Design solutions for the complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public Health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems	Use research-based knowledge and research methods including the design of experiments, analysis and interpretation of data, and the synthesis of the information to Provide valid conclusions.

PO5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	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.
PO7	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.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with 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.
PO11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply the set o one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	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. PROGRAMME SPECIFIC OUTCOMES (PSOs)

By the completion Bachelor of Technology in Information Technology program the student will have following Program specific outcomes.

1. Design secured database applications involving planning, development and maintenance using state of the art methodologies based on ethical values.
2. Design and develop solutions for modern business environments coherent with the advanced technologies and tools.
3. Design, plan and setting up the network that is helpful for contemporary business environments using latest hardware components.
4. Planning and defining test activities by preparing test cases that can predict and correct errors ensuring a socially transformed product catering all technological needs.

4. PEO / PO Mapping:

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

Contribution: 1-Reasonable, 2- Significant, 3-Strong

Year	Sem	Subject Code and Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	
I	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	1.0	1.0	1.0	1.0	-	-	-	-	1.0	-	-	-	-
		CH3124- Engineering Chemistry	2.8	1.8	2.2	1.2	1.0	1.0	2.0	-	-	-	-	-	2.0	-	-	-	-
		GE3131- Basic Electrical and Electronics Engineering	2.8	2.8	1.8	1.7	3.0	2.0	2.0	2.0	2.0	-	-	-	-	1.8	1.5	2.5	2.0
		GE3111- தமிழர்மரபு /Heritage of Tamils																	
		GE3121- Physics and Chemistry Laboratory	3.0	2.4	2.6	1.0	1.2	-	1.0	-	-	-	-	-	1.0	-	2.0	-	-
		GE3134- Engineering Practices Laboratory	3.0	2.0	2.3	2.0	2.3	1.0	-	-	1.0	-	-	1.0	1.0	1.6	2.0	2.5	2.0
		EN3119- English Language Learning Laboratory	1.7	1.2	1.0	1.3	2.0	-	2	-	-	-	2.8	-	1.0	-	-	-	-
I	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	1.8	1.0	2.0	1.0	1.3	-	-	-	-	-	1.0	-	-	-	-
		CH3222-Chemistry for Information Science	1.6	1.0	1.0	2.0	2.3	-	1.0	-	-	-	1.0	1.0	2.0	-	1.0	-	
		GE3231-Problem Solving and Python Programming	2.4	2.6	3.0	2.8	1.8	-	-	-	-	-	1.6	2.0	2.5	-	2.0	1.0	
		GE3211தமிழரும் தொழில் நுட்பமும் /Tamils and Technology																	
		GE3233-Engineering Graphics and Design	3.0	1.0	2.0	-	2.0	-	-	-	-	-	3.0	-	2.0	2.0	1.0	-	1.0
		GE3232-Problem Solving and Python Programming Laboratory	2.6	2.6	3.0	2.8	2.2	-	-	-	-	-	-	2.0	2.0	1.0	3.0	1.7	2.0
		GE3221-Engineering Sciences Laboratory	2.5	2.0	1.8	1.0	1.1	2.0	2.0	2.0	2.0	-	-	-	-	-	-	-	-
		GE3251-NSS/YRC/NSO/Club Activities#																	

Year	Sem	Subject Code and Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4		
II	III	MA3322-Discrete Mathematics	3.0	3.0	2.4	-	-	-	-	-	-	1.0	-	-	1.0	-	-	1.0	-	
		IT3361-Programming and Data Structures	3.0	2.8	2.6	-	-	-	-	-	-	-	-	-	-	3.0	2.0			
		IT3362-Information Technology Essentials	2.8	2.75	2.0	-	2.0	-	2.0	-	-	-	2.0	-	-	2.6	3.0	2.0	3.0	
		CS3361-Object Oriented Programming	2.0	1.4	2.2	2.0	2.0	-	-	-	-	2.4	1.8	1.2	2.4	3.0	1.8	2.2	-	
		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	-	2.5	1.5	-	2.0	-	
		CS3362-Introduction to Data Science	2.2	1.8	1.25	1.6	1.8	1.0	1.0	-	-	-	1.2	1.2	1.2	2.2	2.2	2.4	2.0	-
		IT3363-Programming and Data Structures Laboratory	2.6	2.3	3.0	-	2.0	-	-	-	-	-	-	-	-	3.0	2.0	-	-	
		CS3364-Object Oriented Programming Laboratory	2.6	2.3	3.0		2.0	-	-	-	-	-	-	-	-	3.0	2.0	-	-	
		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	-	
II	IV	MA3422-Applied Mathematics for Information Science	3.0	3.0	-	-	1.0	-	-	-	-	-	-	-	1.0	-	-	-	-	
		IT3461-Operating Systems	2.0	2.0	2.4	1.8	1.0	-	-	-	-	-	-	-	-	-	2.0	-	-	
		CS3463-Data Base Management Systems	2	1.6	2.6	2	1.25	-	-	-	-	2.0	2.0	2.2	2.0	2	1.8	2.6	-	
		IT3462-Artificial Intelligence	2.8	2.6	3.0	2.5	-	-	-	-	-	-	-	-	-	-	2.6	2	-	
		IT3463-Web Essentials	3.0	2.8	2.6	-	3.0	-	-	-	-	-	-	-	-	3.0	2.0	-	-	
		AD3463-Data Communication and Networks	3.0	2.5	2.0	2.3	1.5	-	-	-	-	3.0	-	1.0	2.0	2.0	-	2.0	-	
		GE3451-NCC Credit Course Level-I*																		
		IT3464-Operating Systems Laboratory	2.4	1.8	1.8	1.6	2.0	-	-	-	-	-	-	-	-	-	2.0	-	-	
		CS3466-Database Management Systems Laboratory	2.4	2.6	2.4	2	1.25	-	-	-	-	1.6	1.4	2.6	2.2	2.4	1.8	2.4	-	
		AD3466-Data Communication and Networks Laboratory	2.7	2.5	3.0	2.3	2.5	-	-	-	-	3.0	-	1.0	3.0	2.7	-	2.0	-	

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B.Tech -DEPARTMENT OF INFORMATION TECHNOLOGY

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CHOICE BASED CREDIT SYSTEM

CURRICULA & SYLLABI

SEMESTER -I

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
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	தமிழர்மரபு / Heritage of Tamils	HSMC	1	1	0	0	1
PRACTICAL								
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
TOTAL				27	16	1	10	22

SEMESTER –II

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
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 தொழில் நுட்பமும் /Tamils and Technology	HSMC	1	1	0	0	1
THEORY CUM PRACTICAL								
7.	GE3233	Engineering Graphics and Design	ESC	5	1	0	4	3
PRACTICAL								
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 [#]
TOTAL				30	17	1	12	24

Conducted after college hours

SEMESTER III

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA3322	Discrete Mathematics	BSC	3	3	0	0	3
2.	IT3361	Programming and Data Structures	PCC	3	3	0	0	3
3.	IT3362	Information Technology Essentials	PCC	3	3	0	0	3
4.	CS3361	Object Oriented Programming	PCC	3	3	0	0	3
5.	AD3363	Digital Principles and Computer Organization	PCC	3	3	0	0	3
6.	CS3362	Introduction to Data Science	PCC	3	3	0	0	3
PRACTICAL								
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
TOTAL				27	18	0	9	22.5

SEMESTER-IV

SL NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA3422	Applied Mathematics for Information Science	BSC	2	2	0	0	2
2.	IT3461	Operating Systems	PCC	3	3	0	0	3
3.	CS3463	Data Base Management Systems	PCC	3	3	0	0	3
4.	IT3462	Artificial Intelligence	PCC	3	3	0	0	3
5.	IT3463	Web Essentials	PCC	3	3	0	0	3
6.	AD3463	Data Communication and Networks	PCC	3	3	0	0	3
7.	GE3451	NCC Credit Course Level-I*	PCD	3*	3*	0	0	3*
PRACTICAL								
8.	IT3464	Operating Systems Laboratory	PCC	3	0	0	3	1.5
9.	CS3466	Database Management Systems Laboratory	PCC	3	0	0	3	1.5
10.	AD3466	Data Communication and Networks Laboratory	PCC	3	0	0	3	1.5
TOTAL				26	17	0	9	21.5

* NCC Credit Course level-I 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

S. No.	SUBJECT	CREDITS PER SEMESTER								TOTAL CREDITS	%
	AREA	I	II	III	IV	V	VI	VII	VIII		
1	HSMC	4	4				2	2		12	7.19
2	BSC	12	12	3	2					29	17.36
3	ESC	5	8			2				15	8.98
4	PCC			19.5	19.5	16.5	10.5	9		75	44.91
5	PEC					6	6	6		18	10.78
6	OEC							3		3	1.80
7	EEC	1					3	1	10	15	8.98
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	100

ABBREVIATIONS:

HSMC - HUMANITIES AND SOCIAL SCIENCES

BSC - BASIC SCIENCES

ESC - ENGINEERING SCIENCES

PCC - PROFESSIONAL CORE

PEC - PROFESSIONAL ELECTIVES

OEC- OPEN ELECTIVES

EEC - EMPLOYABILITY ENHANCEMENT COURSES

PCD - PERSONALITY CHARACTER DEVELOPMENT

SEMESTER - I

EN3111

PROFESSIONAL ENGLISH – I

LTP C

3 0 0 3

OBJECTIVES:

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

OUTCOMES:

At the end of the course, learners will be able

- To strengthen the basics of grammar.
- To narrate informal and informal situations.
- To describe a process/product and express opinion.
- To interpret and analyse the content/information given.
- 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 Joevani, Department of English, Anna University.
2. Technical Communication – Principles and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford Univ.Press, 2016, New Delhi.

REFERENCES:

1. Effective Communication Skill, Kulbhusan Kumar, R.S.Salaria, Khanna Publishing House.
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
4. Professional Speaking skills, Aruna Koneru, Oxford University Press.
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
1	3	3	2	2	2	-	-	-	-	3	-	-	-	-	-	-
2	2	2	-	-	-	-	-	-	-	3	1	1	-	-	-	-
3	2	-	2	2	-	-	-	-	-	3	-	1	-	-	-	-
4	3	3	-	2	-	-	2	-	-	3	-	-	-	-	-	-
5	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Avg	2.2	2.6	2	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-	-

OBJECTIVES:

- To understand and apply matrix techniques for engineering applications.
- To familiarize the student with basic calculus and traditions of traditional calculus.
- To solve the problems in single and multivariable calculus and plays an important role in science, economics, engineering.
- Vector calculus can be widely used for modeling the various laws of physics.
- 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

OUTCOMES:

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

TEXT BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 41st Edition, Khanna Publications, Delhi, 2011.3.
Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", S.Chand Private Ltd.,11th Edition, 2005.
- 2.Veerarajan.T, "Engineering Mathematics", McGrawHill Education(India) Private Ltd 2019.

REFERENCES::

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, 8th 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", 3rd Edition, Pearson Education, 2012.

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	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
2	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
3	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
4	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
5	3	2	2	1	-	-	-	-	-	-	-	1	-	-	1	-
Avg	3.0	2.0	2.0	1.0	-	-	-	-	-	-	-	1.0	-	-	1.0	-

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 diagram 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 - CO₂ 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.

REFERENCES:

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	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	1	1	-	-	1	1	-	-	-	-	1	-	-	-	-
2	3	1	1	1	2	1	1	-	-	-		1	-	-	-	-
3	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
4	3	2	2	1	1	1	1	-	-	-	-	1	-	-	-	-
5	2	1	1	1	1	1	1	-	-	-	-	1	-	-	-	-
Avg	2.8	1.4	1.4	1.0	1.25	1.0	1.0	-	-	-	-	1.0	-	-	-	-

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.

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:

- To infer the quality of water from quality parameter data and propose suitable treatment.
- To apply the knowledge of chemical thermodynamics for material design and aspects
- To recommend the proper chemical kinetics for engineering processes and applications.
- To recognize the surface morphology and its engineering applications.
- 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
1	3	2	3	2	-	1	3	-	-	-	-	2	-	-	-	-
2	3	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
3	3	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-
4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
5	2	2	3	2	1	-	1	-	-	-	-	2	-	-	-	-
Avg	2.8	1.8	2.2	1.2	1.0	1.0	2.0	-	-	-	-	2.0	-	-	-	-

GE3131	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- 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 codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations – minimization using K maps (Simple Problems only).

UNIT-V MEASUREMENTS AND INSTRUMENTATION 9

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

REFERENCES:

1. Thomas L. Floyd, ‘Digital Fundamentals’, 11th Edition, Pearson Education, 2017.
2. Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 7th 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 and CO - PSO 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			3						2		2	
2	3	2				2		2					1	2		2
3	2	3	2	2									3			
4	3	3	1		3		2						1		3	
5	3	3	2	1			1						2	1		2
Avg	2.8	2.8	1.8	1.7	3.0	2.0	2.0	2.0					1.8	1.5	2.5	2.0

GE3111

தமிழர் மரபு

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அலகு I மொழிமற்றும் இலக்கியம்

3

இந்தியமொழிக் குடும்பங்கள் - திராவிட மொழிகள்- தமிழ் ஒருசெம்மொழி- தமிழ் செவ்விலக்கியங்கள்- சங்க இலக்கியத்தின் சமயச்சார்பற்றதன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம்- திருக்குறளில் மேலாண்மைக் கருத்துகள்- தமிழ்க்காப்பியங்கள், தமிழகத்தில் சமணபௌத்தசமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள்- சிற்றிலக்கியங்கள்- தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கியவளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு

அலகு II மரபு - பாறைஓவியங்கள்முதல்நவீனஓவியங்கள் - சிற்பக்கலை

3

நடுகல் முதல் நவீனசிற்பங்கள் வரை -ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள் , பொம்மைகள்- தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள்

அலகு III நாட்டுபுறக்கலைகள்மற்றும்வீரவிளையாட்டுகள்

3

நாட்டுப்புற கதைகள், பாடல்கள்-தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து- ஓயிலாட்டம், தோல்பாவைக்கூத்து, சிலம்பாட்டம்- வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்

அலகு IV தமிழர்களின்திணைக்கோட்பாடுகள்

3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள்- தமிழர்கள் போற்றிய அறக்கோட்பாடு -தமிழ்சங்கம்-சங்கம் வளர்த்த தமிழ்- சங்க காலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும்- சங்ககால நகரங்களும் துறைமுகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி கடல் கடந்த நாடுகளில் சோழர்களின் வெற்றி

அலகு Vஇந்தியதேசியஇயக்கம்மற்றும்இந்தியபண்பாட்டிற்குத்தமிழர்களின்பங்களிப்பு

3

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு இந்தியா மற்றும் வெளிநாட்டின் பிறபகுதிகளின் தமிழ்ப் பண்பாட்டின் தாக்கம்- சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு- கல்வெட்டுகள், கையெழுத்துப் படிகள் - தமிழ்ப் புத்தகங்களின் அச்சுவரலாறு

Total Periods: 15 hours

TEXT CUM REFERENCES:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணிணித்தமிழ் – முனைவர். இல.சுந்தரம். (விகடன் பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருதை – 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, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS**3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils –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. கணிணித்தமிழ் – முனைவர். இல.சுந்தரம். (விகடன் பிரசுரம்)
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருதை – 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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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)
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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.

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
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
Avg	3.0	2.4	2.6	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-

CHEMISTRY LABORATORY: (Any five experiments to be conducted)

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 electro analytical 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 Na_2CO_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.

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	3	2	3	1	1	-	1	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	2	-	-	-	-	-	-	1	-	2	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Avg	3	2.4	2.6	1	1.2		1					1		2			

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 lines ketches 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.

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 stepcone pulley.
- c) Assembly of centrifugal pump
- d) Assembly of air conditioner

GROUP B (ELECTRICAL & ELECTRONICS)**III ELECTRICAL ENGINEERING PRACTICE****15**

1. Residential housewiring 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 Energymeter.
6. Measurement of Earth Resistance.
7. Study of Industrial housewiring.
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 logicgates 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 wood working 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 | 15 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
1	3	-	-	-	-	1	-	-	-	-	-	1	2	-	3	-
2	-	1	2		3	-	-	-	-	-	1	-	-	-	2	-
3	-	-	-	3	2	-	-	-	-	-	-	1	1	-	-	2
4	-	2	3	1	2	-	-	-	-	-	-	-		2	-	-
5	-	3	2	2	-	-	-	-	1	-	-	-	2	-	-	-
Avg	3.0	2.0	2.3	2.0	2.3	1.0	-	-	1.0	-	1.0	1.0	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
1	-	-	-	1	-	-	-	-	-	3	-	1	-	-	-	-
2	1	1	-	-	-	-	1	-	-	2	-	1	-	-	-	-
3	2	2	1	2	2	-	-	-	-	3	-	1	-	-	-	-
4	2	1	1	-	-	-	3	-	-	3	-	1	-	-	-	-
5	-	1	-	1	-	-	-	-	-	3	-	1	-	-	-	-
Avg	1.7	1.2	1.0	1.3	2.0	-	2.0	-	-	2.8	-	1.0	-	-	-	-

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
1	-	1	2	1	-	-	-	-	-	3	-	1	-	-	-	-
2	2	2	1	2	2	-	-	-	-	3	1	1	-	-	-	-
3	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-
4	2	3	2	3	-	-	2	-	-	3	-	-	-	-	-	-
5	2	-	1		-	-	-	-	-	2	-	-	-	-	-	-
Avg	2.0	2.0	1.4	2.0	2.0	-	2.0	-	-	2.8	1.0	1.0	-	-	-	-

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 ", 10th 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, 8th Edition, 2015.

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th 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
1	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
2	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
3	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
4	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
5	3	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Avg	3.0	3.0	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-

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 nano materials 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) - Bandgap of nano material - Single Electron Transistor (SET): Tunnelling - Coulomb-blockade effect –Carbon nano tubes: 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

- To understand the classical and quantum-free electron theories, and energy bands in solids.
- To apply the concepts of semiconductor Physics and its applications in various devices.
- To apply the properties of magnetic materials and superconductors in various fields.
- To understand the basics of optical materials and apply knowledge to develop materials for optoelectronic devices.
- 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-HillEducation,2007.
2. M. Arumugam, “Semiconductor Physics and opto electronics”,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”.NarosaPublishingHouse,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”,CRCPress,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
1	3	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-
2	3	1	2	-	1	-	-	-	-	-	-	1	-	-	-	-
3	3	-	1	-	2	1	1	-	-	-	-	1	-	-	-	-
4	3	-	2	1	3	-	1	-	-	-	-	1	-	-	-	-
5	3	1	2	1	2	1	2	-	-	-	-	1	-	-	-	-
Avg	3.0	1.0	1.8	1.0	2.0	1.0	1.3	-	-	-	-	1.0	-	-	-	-

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, nano reactors, nano electronics, 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 (H₂-O₂ fuel cell). Super capacitors: 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 nano electro mechanical systems, applications of nano materials 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 Periods

OUTCOMES:

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

- To apply the gained knowledge on different energy sources and storage devices.
- To recognize the principle and concepts in photochemistry and spectroscopy.
- To recommend smart materials and sensors for the development of innovative materials.
- To utilize the different composites and memory devices.
- 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

CO	PO												PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	
1	1	-	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-
2	1	1	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-
3	1	-	1	-	2	-	-	-	-	-	-	1	-	-	1	-	-
4	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	1	-	-	3	-	-	-	-	-	-	-	2	-	-	-	-
Avg	1.6	1.0	1.0	2.0	2.3	-	1.0	-	-	-	1.0	1.0	2.0	-	1.0	-	-

OBJECTIVES:

- To know the basics of Python programming and write simple Python 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.

UNIT I PYTHON BASICS **9**

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).

UNIT II FUNCTIONS, LIST, TUPLES **9**

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.

UNIT III STRINGS, DICTIONARY, SET **9**

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.

UNIT IV FILES, EXCEPTIONS, MODULES AND PACKAGES **9**

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.

UNIT V CLASSES AND OBJECTS **9**

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
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
1	3	3	3	3	2	-	-	-	-	-	2	2	2	-	-	1
2	3	3	3	3	2	-	-	-	-	-	2	2	-	-	3	-
3	3	3	3	3	2	-	-	-	-	-	2	-	-	-	1	-
4	2	2	-	2	2	-	-	-	-	-	1	-	3	-	2	-
5	1	2	-	-	1	-	-	-	-	-	1	-	-	-	-	1
Avg	2.4	2.6	3.0	2.8	1.8	-	-	-	-	-	1.6	2.0	2.5	-	2.0	1.0

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

சங்க காலத்தில் நெசவுத் தொழில் – பாணைத் 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 – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ – சாரோசெனிக் கட்டிடக் கலை.

அலகு 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. கணிணித் தமிழ் – 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)
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.

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 Thoompu 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).
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.

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**10**

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**16**

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**16**

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 16 SURFACES

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 16

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:

- To construct the conics curves and special curves, use BIS conventions, and specifications for engineering drawing.
- To construct the orthographic projection of lines and plane surfaces.
- To construct the projections and solids and Isometric projection of simple solids.
- To construct projections of section of solids and development of surfaces.
- 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. 53rd Edition 2019 (Fifth Reprint)
2. Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited, 15th Edition 2018

REFERENCES:

1. T. Jeyapooan, “Engineering Graphics Using Auto CAD”, Vikas Publishing House Pvt. LTD, seventh Edition, 2015.
2. Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2011.

4. 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..
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
Avg	3.0	1.0	2.0	-	2.0	-	-	-	-	3.0	-	2.0	2.0	1.0	-	1.0

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, and dictionaries and read and write data from/to files in Python.
- Knowing about 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

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.

TOTAL: 60 PERIODS

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	3	3	3	3	-	-	-	-	-	3	2	1	3	-	-
2	3	3	3	3	3	-	-	-	-	-	3	2	-	-	2	-
3	3	3	3	3	2	-	-	-	-	-	2	-	-	3	-	2
4	3	2	-	2	2	-	-	-	-	-	1	-	-	-	1	-
5	1	2	-	-	1	-	-	-	-	-	1	-	1	-	2	2
Average	2.6	2.6	3.0	2.8	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:**

- 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 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
1	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
2	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
3	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
4	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-
5	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-	-
Avg	3.0	2.4	2.6	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-

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	-	-	-	-	-	-	-	-

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/>

NSS/NSO/YRC & CLUB ACTIVITIES

L T P C
0 0 0 0

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>

NSS/NSO/YRC & CLUB ACTIVITIES

L T P C
0 0 0 0

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
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/>

தமிழ்மன்றம்

பாடத்திட்டத்தின்நோக்கங்கள்

- மாணவர்களைசிறந்தமேடைப்பேச்சாளர்களாகஉருவாக்குவது
- தாய்மொழியின்மேன்மையைபாதுகாப்பது..

பயிற்சித்திட்டம்

1. பேச்சுக்கலைப்பயிற்சி
2. கவிதைமற்றும்கட்டுரைகள்எழுதும்பயிற்சி
3. அறிவியல்பொறியியல்தொழில்நுட்பங்களைத்தமிழில்எழுதுதல்.
4. பட்டிமன்றமேடைகளில்பேசும்பயிற்சி.
5. நாட்டுப்புறப்பாடல்கள்பாடுதல்மற்றும்கதைகள்எழுதும்பயிற்சி

கற்றல்முடிவு

1. பேச்சுக்கலைத்தேர்ச்சி
2. நாட்டுப்புறப்பாடல்கள்பற்றியபுரிதல்

மேற்கோள்கள்

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

NSS/NSO/YRC & CLUB ACTIVITIES

L T P C

0 0 0 0

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>

NSS/NSO/YRC & CLUB ACTIVITIES

L T P C

0 0 0 0

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.

REFERENCES

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/>

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 – Predicates and quantifiers – 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.

TOTAL: 45L PERIODS

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.

REFERENCES:

1. Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4thEdition, 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.

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	3	2	-	-	-	-	-	-	-	-	1	-	-	1	-
2	3	3	3	-	-	-	-	-	1	-	-	1	-	-	1	-
3	3	3	2	-	-	-	-	-	1	-	-	1	-	-	1	-
4	3	3	2	-	-	-	-	-	-	-	-	1	-	-	1	-
5	3	3	3	-	-	-	-	-	1	-	-	1	-	-	1	-
Avg	3.0	3.0	2.4	-	-	-	-	-	1.0	-	-	1.0	-	-	1.0	-

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 – Operators – 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)

REFERENCES:

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., III 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 – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	2	2	-	-	-	-	-	-	-	-	-	3	2	-	-
2	3	3	2	-	-	-	-	-	-	-	-	-	3	2	-	-
3	3	3	3	-	-	-	-	-	-	-	-	-	3	2	-	-
4	3	3	3	-	-	-	-	-	-	-	-	-	3	2	-	-
5	3	3	3	-	-	-	-	-	-	-	-	-	3	2	-	-
Avg	3	2.8	2.6	-	-	-	-	-	-	-	-	-	3	2		

OBJECTIVES:

- To introduce the concept of Internet, Networks and its working principles.
- To know scripting languages and PHP with MySQL.
- To know basic concept of Information technology
- To understand the simple concept of mobile communication with networking.
- To understand various applications related to Information Technology.

UNIT – I: WEB ESSENTIALS 9

Creating a Website – Working principle of a Website – Browser fundamentals – Authoring tools – Types of servers: Application Server – Web Server – Database Server

UNIT - II: SCRIPTING ESSENTIALS AND PHP WITH MYSQL 9

Need for Scripting languages – Types of scripting languages – Client side scripting – Server side scripting – Embedding PHP in HTML – Understanding identifiers – Using Operators – Making Decisions with conditionals – Arrays – Functions – Object oriented PHP- Working with MySQL Databases– Accessing MySQL Database with PHP.

UNIT - III: NETWORKING ESSENTIALS 9

Fundamental computer network concepts – Types of computer networks – Network layers – TCP/IP model – Wireless Local Area Network – Ethernet – WiFi – Network Routing – Switching – Network components.

UNIT - IV: MOBILE COMMUNICATION ESSENTIALS 9

Cell phone working fundamentals – Cell phone frequencies & channels – Digital cell phone components – Generations of cellular networks – Cell phone network technologies / architecture – Voice calls & SMS

UNIT - V: APPLICATION ESSENTIALS AND MODERN INFORMATION RETRIEVAL 9

Design and development of information systems - Simple database applications – Multimedia applications - Overview effective IRS –File Structures - User Interfaces – Visualization - Searching the Web

TOTAL: 45 PERIODS

OUTCOMES:

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

- Design and deploy web-sites
- Design and deploy simple web-applications
- Create simple database applications
- Develop information system concepts
- Describe the basics of networking, mobile communications, basic essential of Information Technology and modern information retrieval

TEXT BOOKS:

1. Luke Welling , Laura Thomson – “PHP and MySQL Web Development” , Pearson Education. (UNIT – II)
2. James F. Kurose, — “Computer Networking”: A Top-Down Approach, Sixth Edition, Pearson, 2012. (UNIT – III)
3. Ricardo Baeza Yates, Berthier Ribiero Neto – “Modern Information Retrieval”, Pearson Publications. (UNIT – V)

REFERENCES:

1. Robin Nixon, “Learning PHP, MySQL, JavaScript, CSS & HTML5” Third Edition, O’REILLY, 2014 (UNIT – II)
2. GottapuSasibhushana Rao, “Mobile Cellular Communication”, Pearson, 2012. (UNIT – IV)
3. Robert R.Korfhage, Information Storage and Retrieval , Wiley India Computer Publications. (UNIT – V)
4. it-ebooks.org (UNIT – I)

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	2	2	-	2	-	2	-	-	2	-	-	3	-	2	-
2	3	3	2	-	2	-	2	-	-	2	-	-	3	-	2	-
3	3	3	-	-	2	-	-	-	-	-	-	-	-	3	-	3
4	3	3	2	-	-	-	-	-	-	2	-	-	-	3	-	3
5	2	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-
Avg	2.8	2.75	2	-	2	-	2	-	-	2	-	-	2.6	3	2	3

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 – 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 9
 COMPONENTS**

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

OUTCOMES:

At the end of the course, the student should 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 real world 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 Reference”, 11 th Edition, McGraw Hill Education, New Delhi, 2019 .
2. Herbert Schildt, “Introducing JavaFX 8 Programming”, 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 – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	1	1	3	1	3	-	-	-	3	2	2	2	3	1	2	-
2	2	1	3	2	1	-	-	-	2	1	1	3	3	3	2	-
3	3	3	1	2	2	-	-	-	3	2	1	2	3	1	3	-
4	3	1	2	2	2	-	-	-	1	2	1	3	3	1	1	-
5	1	1	2	3	2	-	-	-	3	2	1	2	3	3	3	-
Avg	2	1.4	2.2	2	2				2.4	1.8	1.2	2.4	3	1.8	2.2	-

OBJECTIVES:

- To analyze and design combinational circuits.
- To analyze and design sequential circuits.
- To understand the basic structure and operation of a digital computer.
- To study the design of data path unit, control unit for processor and to familiarize with the hazards.
- To understand the concept of various memories and I/O interfacing.

UNIT – I: COMBINATIONAL LOGIC 9

Combinational Circuits – Karnaugh Map - Analysis and Design Procedures – Binary Adder – Subtractor – Decimal Adder - Magnitude Comparator – Decoder – Encoder – Multiplexers - Demultiplexers.

UNIT - II: SYNCHRONOUS SEQUENTIAL LOGIC 9

Introduction to Sequential Circuits – Flip-Flops – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design – Moore/Mealy models, state minimization, state assignment, circuit implementation - Registers – Counters..

UNIT - III: COMPUTER FUNDAMENTALS 9

Functional Units of a Digital Computer: Von Neumann Architecture – Operation and Operands of Computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High Level Language.

UNIT - IV: PROCESSOR 9

I/O Instruction Execution – Building a Data Path – Designing a Control Unit – Hardwired Control, Microprogrammed Control – Pipelining – Data Hazard – Control Hazards.

UNIT - V: MEMORY AND I/O 9

Memory Concepts and Hierarchy – Memory Management – Cache Memories: Mapping and Replacement Techniques – Virtual Memory – DMA – I/O – Accessing I/O: Parallel and Serial Interface – Interrupt I/O – Interconnection Standards: USB, SATA.

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should 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 Verilog”, Sixth Edition, Pearson Education, 2018.
2. David A. Patterson, John L. Hennessy, “Computer Organization and Design, The Hardware/Software Interface”, Sixth Edition, Morgan Kaufmann/Elsevier, 2020.

REFERENCES:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw-Hill, 2012.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Tenth Edition, Pearson Education, 2016.
3. M. Morris Mano, “Digital Logic and Computer Design”, Pearson Education, 2016.

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	-	-	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	-
Avg	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 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

OUTCOMES:**At the end of the course, the student should 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 Science”, Manning Publications, 2016. (Unit I)
2. Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017. (Units II and III)
3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016. (Units IV and V)

REFERENCES:

Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014.

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2	-
2	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1	-
3	2	2	1	2	2	1	1	-	1	2	1	3	2	2	3	-
4	3	2	2	1	2	-	-	-	1	1	2	2	3	3	2	-
5	2	2	1	2	2	-	-	-	1	1	1	2	2	2	2	-
Avg	2.2	1.8	1.25	1.6	1.8	1.0	1.0	-	1.2	1.2	1.2	2.2	2.2	2.4	2.0	-

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 – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	-	-	-	2	-	-	-	-	-	-	-	3	2	-	-
2	2	2	-	-	-	-	-	-	-	-	-	-	3	2	-	-
3	2	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-
4	3	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-
5	3	3	3	-	2	-	-	-	-	-	-	-	3	2	-	-
Avg	2.6	2.3	3.0	-	2.0	-	-	-	-	-	-	-	3.0	2.0	-	-

OBJECTIVES:

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of objects and classes.
- To Build packages, interfaces, 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.

Operating Systems: Linux / Windows**Front End Tools: Eclipse IDE / Netbeans IDE****TOTAL: 45 PERIODS**

OUTCOMES:

At the end of the course, the student should 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 – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	-	-	-	2	-	-	-	-	-	-	-	3	2	-	-
2	2	2	-	-	-	-	-	-	-	-	-	-	3	2	-	-
3	2	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-
4	3	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-
5	3	3	3	-	2	-	-	-	-	-	-	-	3	2	-	-
Avg	2.6	2.3	3.0		2.0	-	-	-	-	-	-	-	3.0	2.0	-	-

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

TOTAL: 45 PERIODS

OUTCOMES:

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

- Make use of the python libraries 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 – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	2	1	1	-	-	-	-	1	3	3	3	1	3	2	-
2	3	2	2	3	1	-	-	-	3	1	3	2	1	3	3	-
3	3	2	1	3	1	-	-	-	2	1	1	1	3	2	3	-
4	2	3	1	3	-	-	-	-	2	3	2	3	3	3	1	-
5	1	2	3	1	1	-	-	-	2	1	3	1	1	3	3	-
Avg	2.4	2.2	1.6	2.2	1	-	-	-	2	1.8	2.4	2	1.8	2.8	2.4	-

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.

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 Applications, 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 Numbers, John Wiley and Sons , Singapore, 2004.
3. San Ling and Chaoping Xing, —Coding Theory – A first Course, Cambridge Publications, Cambridge, 2004.

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	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
2	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
3	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
4	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
5	3	3	-	-	1	-	-	-	-	-	-	1	-	-	-	-
Avg	3.0	3.0	-	-	1.0	-	-	-	-	-	-	1.0	-	-	-	-

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 Page Table - 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", Ninth Edition, Wiley, 2014.(Unit-I-V)
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition,2022 New Delhi.(Unit-II,III,IV).

REFERENCES:

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

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	-	-	-	-	-	-	-	-	-	2	-	-
2	2	2	3	1	-	-	-	-	-	-	-	-	-	2	-	-
3	1	3	2	2	1	-	-	-	-	-	-	-	-	2	-	-
4	1	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
5	3	1	2	1	1	-	-	-	-	-	-	-	-	2	-	-
Avg	2.0	2.0	2.4	1.8	1.0	-	-	-	-	-	-	-	-	2.0	-	-

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

- Describe the fundamental elements of relational database managements.
- Apply ER model to 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

REFERENCES:

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	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	2	2	3	2	1	-	-	-	2	1	1	1	2	1	3	-
2	3	1	1	1	1	-	-	-	2	3	3	3	3	1	2	-
3	3	2	3	2	1	-	-	-	2	1	1	2	2	3	3	-
4	1	2	3	2	-	-	-	-	3	2	3	3	1	2	3	-
5	1	1	3	3	2	-	-	-	1	3	3	1	2	2	2	-
Avg	2.0	1.6	2.6	2.0	1.25	-	-	-	2.0	2.0	2.2	2.0	2.0	1.8	2.6	-

OBJECTIVES:

The objective of this course is to enable the students to

- To provide a strong foundation on fundamental concepts in Artificial Intelligence
- Develop general-purpose problem solving agents
- Understand the Game theory and Constraint Satisfaction Problems
- Learn about logical reasoning agents, and agents that reason under uncertainty
- Employ AI techniques to represent Knowledge and Planning

UNIT I INTRODUCTION 9

Introduction to Artificial Intelligence- Problem formulation, Problem Definition -Agents and Environments – Concept of Rationality – Nature of Environments – Structure of Agents – Problem solving agents – Search Algorithms – Uninformed Search Strategies.

UNIT II PROBLEM SOLVING 9

Informed (Heuristic) Search Strategies – Heuristic functions- Problem solving methods - Local search and optimization problems – Local search in continuous space – Search with non-deterministic actions – Search in partially observable environments – Online search agents and Unknown environments

UNIT III GAME PLAYING AND CSP 9

Game theory – Optimal decisions in games – Alpha-Beta Pruning -Expert systems-Inference-Rules – Monte-carlo tree search – Stochastic games – Partially observable games – Constraint Satisfaction Problems – Constraint propagation – Backtracking search for CSP – Local search for CSP – Structure of CSP.

UNIT IV LOGICAL AGENTS 9

Knowledge-based agents – Propositional logic – Propositional theorem proving – Propositional model checking – Agents based on propositional logic – First-order logic – Syntax and semantics – Knowledge representation and engineering – Inferences in first-order logic – Forward Chaining and Backward Chaining- Genetic Algorithms.

UNIT V KNOWLEDGE REPRESENTATION AND PLANNING 9

Ontological engineering – Categories and objects – Events – Mental objects and modal logic – Reasoning systems for categories – Reasoning with default information – Classical planning – Algorithms for classical planning – Heuristics for planning – Hierarchical planning – Non-deterministic domains – Time, schedule, and resources – Analysis.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Provide a basic exposition to the goals and methods of Artificial Intelligence
- Choose appropriate algorithms for solving given AI problems
- Solve problems in Games and Constraint Satisfaction Problems
- Design and implement logical reasoning agents
- Design methods to represent Knowledge and Planning

TEXT BOOKS:

1. Stuart Russel and Peter Norvig, “Artificial Intelligence: A Modern Approach”, Fourth Edition, Pearson Education, 2020.[Unit 1&4]
2. Elaine Rich and Kevin Knight, —Artificial Intelligence, Third Edition, Tata McGraw Hill, 2010.[Unit 1,4,5]

REFERENCES:

1. Dan W. Patterson, “Introduction to Artificial Intelligence and Expert System”, Pearson Education, 2007
2. Kevin Night, Elaine Rich, and Nair B., “Artificial Intelligence”, McGraw Hill, 2008
3. Patrick H. Winston, "Artificial Intelligence", Third edition, Pearson Edition, 2006
4. Deepak Khemani, “Artificial Intelligence”, Tata McGraw Hill Education, 2013
(<http://nptel.ac.in/>)
5. Artificial Intelligence by Example: Develop machine intelligence from scratch using real artificial intelligence use cases - by Dennis Rothman, 2018

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	2	-	-	-	3	-	-	-	-	-	-	-	2	-	-
2	2	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
3	3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
4	3	3	3	2	-	-	-	-	-	-	-	-	-	3	2	-
5	3	3	3	3	-	-	-	-	-	-	-	-	-	2	-	-
Avg	2.8	2.6	3.0	2.5	-	-	-	-	-	-	-	-	-	2.6	2.0	-

OBJECTIVES

- To understand the basics of website, web server and web client
- To design interactive web pages using HTML and CSS.
- To design webpages using scripting languages.
- To learn server side programming and scripting using PHP.
- To learn server side programming using servlets and database connectivity.

UNIT I WEBSITE BASICS**9**

Internet Overview – Fundamental computer network concepts – Web Protocols – URL – Domain Name- Web Browsers and Web Servers- Working principle of a Website –Creating a Website – Client-side and server-side scripting

UNIT II WEB DESIGNING**9**

HTML – Form Elements – Input types and Media elements – CSS3 – Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface.

UNIT III CLIENT-SIDE PROCESSING AND SCRIPTING**9**

JavaScript Introduction – Variables and Data Types-Statements – Operators – Literals-Functions- Objects-Arrays-Built-in Objects- Regular Expression, Exceptions, Event handling, Validation – JavaScript Debuggers.

UNIT IV SERVER SIDE PROCESSING AND SCRIPTING**9**

PHP – Working principle of PHP – PHP Variables – Constants – Operators – Flow Control and Looping – Arrays – Strings – Functions – File Handling – File Uploading – Email Basics – Email with attachments – PHP and HTML – Simple PHP scripts – Databases with PHP.

UNIT V SERVLETS AND DATABASE CONNECTIVITY**9**

Servlets: Java Servlet Architecture – Servlet Life cycle- Form GET and POST actions -Sessions – Cookies – Database connectivity – JDBC Creation of simple interactive applications – Simple database applications

TOTAL: 45 PERIODS

OUTCOMES:

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

- Design simple web pages using web clients and access web server.
- Create static web pages using HTML and apply style with CSS.
- Program client side scripting.
- Create server side programming and scripting.
- Understand servlets and database connectivity.

TEXT BOOKS :

1. A.A.Puntambekar, “Web Essentials”, Technical Publications, 2023 (Unit I to V)
2. Robin Nixon, “Learning PHP, MySQL, JavaScript, CSS & HTML5” Third Edition, O’Reilly publishers, 2014. (Unit II, III and IV)

REFERENCES:

1. Jeffrey C. Jackson, “Web Technologies–A Computer Science Perspective”, Pearson Education, 2006. (Unit I to V)
2. Steven Holzener , “PHP – The Complete Reference”, 1st Edition, Mc-Graw Hill, 2017 (Unit-IV)
Fritz Schneider, Thomas Powell, “JavaScript – The Complete Reference”, 3rd Edition, McGraw Hill Publishers, 2017 (Unit-III)
3. Bates, “Developing Web Applications”, Wiley Publishers, 2006 (Unit II, III, IV)

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	2	2	-	3	-	-	-	-	-	-	-	3	2	-	-
2	3	3	2	-	3	-	-	-	-	-	-	-	3	2	-	-
3	3	3	3	-	3	-	-	-	-	-	-	-	3	2	-	-
4	3	3	3	-	3	-	-	-	-	-	-	-	3	2	-	-
5	3	3	3	-	3	-	-	-	-	-	-	-	3	2	-	-
Avg	3.0	2.8	2.6	-	3.0	-	-	-	-	-	-	-	3.0	2.0	-	-

OBJECTIVES:

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

UNIT-I: INTRODUCTION AND APPLICATION LAYER 10

Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Introduction to Sockets - Application Layer protocols: HTTP – FTP – Email protocols (SMTP - POP3 - IMAP - MIME) – DNS – SNMP

UNIT-II: TRANSPORT LAYER 9

Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DECbit, RED) – SCTP – Quality of Service.

UNIT-III: NETWORK LAYER 7

Switching: Packet Switching - Internet protocol - IPV4 – IP Addressing – Sub netting - IPV6, ARP, RARP, ICMP, DHCP.

UNIT-IV: ROUTING 7

Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF – Path-vector routing - BGP - Multicast Routing: DVMRP – PIM.

UNIT-V: DATA LINK AND PHYSICAL LAYERS 12

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance – Transmission media- Switching – Circuit Switching.

TOTAL: 45 PERIODS

OUTCOMES:

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

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

TEXT BOOKS:

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

REFERENCES:

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

CO – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	-	2	3	-	-	-	-	-	-	-	-	3	-	1	-
2	3	2	-	-	2	-	-	-	-	-	-	-	3	-	3	-
3	-	-	3	-	1	-	-	-	3	-	1	2	1	-	3	-
4	-	-	1	3	-	-	-	-	-	-	-	-	1	-	1	-
5	3	3	-	1	-	-	-	-	-	-	-	2	2	-	2	-
Avg	3.0	2.5	2.0	2.3	1.5	-	-	-	3.0	-	1.0	2.0	2.0	-	2.0	-

GE 3451

NCC Credit Course Level - I

L T P C

(Common to Army, Navy & Air)

3 0 0 3

Objective:

1. To know the basic structure of NCC and Role of NCC
2. To improve the cadet's personality skill and leadership quality
3. To make the interest of cadets to involve in social activities
4. Preventing the potential damage and suffering
5. 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:

1. Understand their roles and responsibilities
2. Demonstrate the knowledge of human values and morals
3. Actively participate in social service and development activities
4. Understand the importance of disaster management
5. 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

REFERENCES:

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

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, 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 – 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	3	1	1	-	-	-	-	-	-	-	-	2	-	-
2	3	1	1	2	2	-	-	-	-	-	-	-	-	2	-	-
3	3	3	2	1	2	-	-	-	-	-	-	-	-	2	-	-
4	1	2	2	3	2	-	-	-	-	-	-	-	-	2	-	-
5	2	2	1	1	3	-	-	-	-	-	-	-	-	2	-	-
Avg	2.4	1.8	1.8	1.6	2.0	-	-	-	-	-	-	-	-	2.0	-	-

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

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 – PO – PSO Mapping

CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	3	3	3	3	-	-	-	-	3	1	3	2	2	3	2	-
2	2	2	3	2	2	-	-	-	1	2	3	3	2	1	2	-
3	3	3	2	1	1	-	-	-	1	1	1	3	2	3	3	-
4	1	3	3	3	1	-	-	-	1	1	3	2	3	1	3	-
5	3	2	1	1	1	-	-	-	2	2	3	1	3	1	2	-
Avg	2.4	2.6	2.4	2.0	1.25	-	-	-	1.6	1.4	2.6	2.2	2.4	1.8	2.4	-

OBJECTIVES:

- To understand examine the network protocol and analyser
- To learn to implement TCP sockets
- To visualize the Simulation of DNS
- To build simulating ARP /RARP protocols
- To study Network simulator

LIST OF EXPERIMENTS:

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

TOTAL: 45 PERIODS**List of Equipment:** (30 Students per Batch)

Java, HTML5, NS2 simulator (Open source software)

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

- Understand and examine the network protocol and analyser
- Learn and implement TCP sockets.
- Visualize the Simulation of DNS.
- Build simulating ARP /RARP protocols
- Experience the Network simulator.

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	-	-	3	-	-	-	-	-	-	-	-	3	-	1	-
2	-	2	-	2	2	-	-	-	-	-	-	-	3	-	3	-
3	2	-	3	-	1	-	-	-	3	-	1	-	-	-	3	-
4	-	3	-	3	-	-	-	-	-	-	-	3	-	-	1	-
5	3	-	-	1	2	-	-	-	-	-	-	-	2	-	2	-
Avg	2.7	2.5	3.0	2.3	2.5	-	-	-	3.0	-	1.0	3.0	2.7	-	2.0	-