THAMIRABHARANI ENGINEERING COLLEGE
(AN AUTONOMOUS INSTITUTION)

REGULATIONS 2024
B. E. COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)
CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABI FOR SEMESTERS I TO VIII

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24IP0101	Induction Programme	-	-	-	-	-	0
THEORY								
2	24HS0101	Professional English I	HSMC	3	0	0	3	3
3	24MA0101	Matrices and Calculus	BSC	3	1	0	4	4
4	24PH0101	Engineering Physics I	BSC	3	0	0	3	3
5	24CY0101	Engineering Chemistry	BSC	3	0	0	3	3
6	24GE0101	Problem Solving and Python Programming	ESC	3	0	0	3	3
7	24GE0102	தமிழர் மரபு / Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
8	24GE0103	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9	24BS0101	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10	24HS0102	English Laboratory I	EEC	0	0	2	2	1
		TOTAL		**16**	**1**	**10**	**27**	**22**

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	24HS0203	Professional English II	HSMC	2	0	0	2	2
2	24MA0202	Ordinary Differential Equations and Transform Techniques	BSC	3	1	0	4	4
3	24PH0202	Engineering Physics II	BSC	3	0	0	3	3
4	24GE0204	Environmental Science and Engineering	BSC	2	0	0	2	2
5	24GE0205	Engineering Graphics	ESC	2	0	4	6	4
6	24GE0206	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
7	24GE0207	தமிழரும் தொழில் நுட்பமும்/ Tamils and Technology	HSMC	1	0	0	1	1
PRACTICALS								
8	24GE0208	Basic Electrical and Electronics Engineering Laboratory	ESC	0	0	4	4	2
9	24GE0209	Engineering Practices Laboratory	ESC	0	0	4	4	2
10	24HS0204	English Laboratory II	EEC	0	0	2	2	1
			TOTAL	**16**	**1**	**14**	**31**	**24**

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	24MA0305	Discrete Mathematics	BSC	3	1	0	4	4
2	24CS5301	Digital Principles and System Design	PCC	3	0	0	3	3
3	24CS5302	C Programming and Data Structures	PCC	3	0	0	3	3
4	24CS5303	Object Oriented Programming	PCC	3	0	0	3	3
5	24CS5304	Computer Architecture	PCC	3	0	0	3	3
6	24CS5305	Data Science Fundamentals	PCC	3	0	0	3	3
PRACTICALS								
7	24CS5306	C Programming and Data Structures Laboratory	PCC	0	0	4	4	2
8	24CS5309	Object Oriented Programming Laboratory	PCC	0	0	4	4	2
9	24CS5310	Data Science Fundamentals Laboratory	PCC	0	0	4	4	2
TOTAL				**18**	**1**	**12**	**31**	**25**

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	24CB7401	Database Management Systems and Security	PCC	3	0	0	3	3
2	24CB7402	Operating Systems and Security	PCC	3	0	0	3	3
3	24AD6303	Artificial Intelligence	PCC	3	0	0	3	3
4	24CS5401	Design and Analysis of Algorithms	PCC	3	0	0	3	3
5	24CS5404	Computer Networks	PCC	3	0	2	5	4
PRACTICALS								
6	24CB7403	Database Management Systems and Security Laboratory	PCC	0	0	4	4	2
7	24CB7404	Operating Systems and Security Laboratory	PCC	0	0	4	4	2
8	24GE0412	Soft Skills I	EEC	0	0	4	4	2
			TOTAL	**15**	**0**	**14**	**29**	**22**

SEMESTER V

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	24CB7501	Cryptography and Cyber Security	PCC	3	0	0	3	3
2	24AD6403	Machine Learning	PCC	3	0	0	3	3
3	24CS5501	Compiler Design	PCC	3	0	2	5	4
4	24CS5502	Software Engineering	PCC	3	0	0	3	3
5	24HS0505	English for competitive Examinations	HSMC	3	0	0	3	3
6	24CB75XX	Professional Elective I	PEC	3	0	0	3	3
PRACTICALS								
7	24CB7502	Cryptography and Cyber Security Laboratory	PCC	0	0	4	4	2
			TOTAL	**18**	**0**	**6**	**24**	**21**

SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	24CB7601	Cyber Forensics	PCC	3	0	0	3	3
2	24CB7602	Engineering Secure Software Systems	PCC	3	0	0	3	3
3	24CS5601	Distributed Computing	PCC	3	0	0	3	3
4	24CS5602	Embedded Systems and IoT	PCC	3	0	2	5	4
5	24CB76XX	Professional Elective II	PEC	3	0	0	3	3
6	24OXX6XX	Open Elective I	OEC	3	0	0	3	3
PRACTICALS								
7	24CB7603	Societal Oriented Project	EEC	0	0	2	2	1
8	24GE0614	Soft Skills II	EEC	0	0	4	4	2
			TOTAL	**18**	**0**	**8**	**26**	**22**

SEMESTER VII

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	24CB7701	Cryptocurrency and Blockchain Technologies	PCC	3	0	0	3	3
2	24CB7702	Malware Analysis	PCC	3	0	0	3	3
3	24CB77XX	Professional Elective III	PEC	3	0	0	3	3
4	24CB77XX	Professional Elective IV	PEC	3	0	0	3	3
5	24OXX7XX	Open Elective II	OEC	3	0	0	3	3
PRACTICALS								
6	24CB7703	Project Work Phase I	EEC	0	0	12	12	6
7	24CB7704	Internship	EEC	0	0	0	0	2
TOTAL				**15**	**0**	**12**	**27**	**23**

SEMESTER VIII

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1	24CB7801	Project Work Phase II	EEC	0	0	16	16	8

TOTAL CREDITS: 167

PROFESSIONAL ELECTIVE I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24CB7503	Web Technology	PEC	3	0	0	3	3
2	24CB7504	Modern Cryptography	PEC	3	0	0	3	3
3	24CB7505	Cyber Laws and Security Policies	PEC	3	0	0	3	3
4	24CB7506	Storage Technologies	PEC	3	0	0	3	3
5	24CB7507	Quantum Computing	PEC	3	0	0	3	3

PROFESSIONAL ELECTIVE II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24CB7604	Ethical Hacking and Security	PEC	3	0	0	3	3
2	24CB7605	Web Application Security	PEC	3	0	0	3	3
3	24CS5606	Principles of Programming Languages	PEC	3	0	0	3	3
4	24CS5607	Neural Networks and Deep Learning	PEC	3	0	0	3	3
5	24CS5611	App Development	PEC	3	0	0	3	3

PROFESSIONAL ELECTIVE III

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24CB7705	Social Network Security	PEC	3	0	0	3	3
2	24CB7706	Virtualization	PEC	3	0	0	3	3
3	24CB7707	Digital and Mobile Forensics	PEC	3	0	0	3	3
4	24CS5701	Cloud Computing	PEC	3	0	0	3	3
5	24CS5704	UI and UX Design	PEC	3	0	0	3	3

PROFESSIONAL ELECTIVE IV

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24CB7707	Data Analytics for Fraud Detection	PEC	3	0	0	3	3
2	24CB7708	Security and Privacy in Cloud	PEC	3	0	0	3	3
3	24CB7709	Software Defined Networks	PEC	3	0	0	3	3
4	24CB7710	Cloud Service Management	PEC	3	0	0	3	3
5	24CB7711	Security Assessment and Risk Analysis	PEC	3	0	0	3	3

OPEN ELECTIVE I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24OCY601	Water Technology for Industries	OEC	3	0	0	3	3
2	24OEC602	Wireless Technologies	OEC	3	0	0	3	3
3	24OEE601	Energy Technology	OEC	3	0	0	3	3
4	24OEE602	Batteries and Management System	OEC	3	0	0	3	3
5	24OEE603	Sensors and Actuators	OEC	3	0	0	3	3
6	24OCE601	Air and Noise Pollution Control Engineering	OEC	3	0	0	3	3
7	24OCE602	Solid and Hazardous Waste Management	OEC	3	0	0	3	3
8	24OME601	Manufacturing Technology	OEC	3	0	0	3	3
9	24OME602	Hydraulic and Pneumatic Machines	OEC	3	0	0	3	3

OPEN ELECTIVE II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1	24OHS701	English for Engineers	OEC	3	0	0	3	3
2	24OCY701	Chemistry of Products	OEC	3	0	0	3	3
3	24OEC701	Consumer Electronics	OEC	3	0	0	3	3
4	24OEC702	Principles of Modern Communication System	OEC	3	0	0	3	3
5	24OEE701	Electric and Hybrid Vehicles	OEC	3	0	0	3	3
6	24OEE702	Energy Conservation and Management	OEC	3	0	0	3	3
7	24OCE701	Rehabilitation/Heritage Restoration	OEC	3	0	0	3	3
8	24OCE702	Prefabricated Structures	OEC	3	0	0	3	3
9	24OCE703	Airports and Harbours	OEC	3	0	0	3	3
10	24OME702	Sustainable Manufacturing	OEC	3	0	0	3	3

SUMMARY

S. No.	Subject Area	Credits per Semester								% of Subject Area	Total Credits
		I	II	III	IV	V	VI	VII	VIII		
1	HSMC	4	3	-	-	3	-	-	-	6	10
2	BSC	12	9	4	-	-	-	-	-	15	25
3	ESC	5	11	-	-	-	-	-	-	9	16
4	PCC	-	-	21	20	15	13	6	-	45	75
5	PEC	-	-	-	-	3	3	6	-	7	12
6	OEC	-	-	-	-	-	3	3	-	4	6
7	EEC	1	1	-	2	-	3	8	8	14	23
8	Non-Credit/ Mandatory	-	-	-	-	-	-	-	-	0	0
Total		22	24	25	22	21	22	23	8	100	167

SEMESTER I

24IP0101	INDUCTION PROGRAMME	L	T	P	C
		-	-	-	0

This is a mandatory 2 week programme to be conducted as soon as the students enter the institution. Normal classes start only after the induction program is over.

The induction programme has been introduced by AICTE with the following objective:

"Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed. One will have to work closely with the newly joined students in making them feel comfortable, allow them to explore their academic interests and activities, reduce competition and make them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and build character."

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

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

(i) Physical Activity

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

(ii) Creative Arts

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

(iii) Universal Human Values

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

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

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

(iv) Literary Activity

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

(v) Proficiency Modules

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

(vi) Lectures by Eminent People

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

(vii) Visits to Local Area

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

(viii) Familiarization to Dept./Branch & Innovations

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

(ix) Department Specific Activities

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

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

REFERENCES:

Guide to Induction program from AICTE

24HS0101	PROFESSIONAL ENGLISH I	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To improve the communicative competence of learners.
- To learn to use basic grammatic structures in suitable contexts.
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text.
- To help learners use language effectively in professional contexts.
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.

UNIT I	INTRODUCTION TO EFFECTIVE COMMUNICATION	9

What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C's of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One-word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT II	NARRATION AND SUMMATION	9

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT III	DESCRIPTION OF A PROCESS / PRODUCT	9

Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT IV	CLASSIFICATION AND RECOMMENDATIONS	9

Reading – Newspaper articles; Journal reports and Non Verbal Communication (tables, pie charts) - Writing – Note-making / Note-taking (*Study skills to be taught, not tested); Writing

recommendations; Transferring information from non-verbal (chart, graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT V	EXPRESSION	9

Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Use appropriate words in a professional context.

CO2: Gain understanding of basic grammatical structures and use them in right context.

CO3: Read and infer the denotative and connotative meanings of technical texts.

CO4: Read and interpret information presented in tables, charts and other graphic forms.

CO5: Write definitions, descriptions, narrations and essays on various topics.

TEXT BOOKS:

1. "English for Engineers & Technologists", Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition).
2. Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, "English for Science & Technology", Cambridge University Press, Authored by, Department of English, Anna University, 2021.

REFERENCE BOOKS:

1. Meenakshi Raman and Sangeeta Sharma, "Technical Communication – Principles and Practices", Oxford Univ. Press, 2016, New Delhi.
2. Lakshminarayanan, "A Course Book on Technical English", Scitech Publications (India) Pvt. Ltd.
3. Aysha Viswamohan, "English for Technical Communication" (With CD), Mcgraw Hill Education, ISBN: 0070264244.
4. Kulbhusan Kumar and RS Salaria, "Effective Communication Skill", Khanna Publishing House.
5. Dr. V. Chellammal, "Learning to Communicate", Allied Publishing House, New Delhi, 2003.

ASSESSMENT PATTERN

Two internal assessments and an end semester examination to test students' reading and writing skills along with their grammatical and lexical competence.

CO – PO – PSO MAPPING:

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

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

24MA0101	MATRICES AND CALCULUS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I	MATRICES	9+3

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

UNIT II	DIFFERENTIAL CALCULUS	9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable.

UNIT III	FUNCTIONS OF SEVERAL VARIABLES	9+3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers

UNIT IV	INTEGRAL CALCULUS	9+3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT V	MULTIPLE INTEGRALS	9+3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications: Moments and centres of mass, moment of inertia.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions.

CO4: Apply different methods of integration in solving practical problems.

CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXT BOOKS:

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCE BOOKS:

1. Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016.
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K. "Calculus", Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics", Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus", 14th Edition, Pearson India, 2018.

CO – PO – PSO MAPPING:

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

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

24PH0101	ENGINEERING PHYSICS I	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To make the students effectively to achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- To equip the students to be successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT I	MECHANICS	9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT II	ELECTROMAGNETIC WAVES	9

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

UNIT III	OSCILLATIONS, OPTICS AND LASERS	9

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

UNIT IV	BASIC QUANTUM MECHANICS	9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

UNIT V	APPLIED QUANTUM MECHANICS	9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the importance of mechanics.

CO2: Express their knowledge in electromagnetic waves.

CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers.

CO4: Understand the importance of quantum physics.

CO5: Comprehend and apply quantum mechanical principles towards the formation of energy bands.

TEXT BOOKS:

1. D.Kleppner and R.Kolenkow. "An Introduction to Mechanics", McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, "Electricity and Magnetism", Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw- Hill (Indian Edition), 2017.

REFERENCE BOOKS:

1. R. Wolfson. "Essential University Physics", Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, "Physics" – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K. Thyagarajan and A. Ghatak. "Lasers: Fundamentals and Applications", Laxmi Publications, (Indian Edition), 2019.
4. D. Halliday, R. Resnick and J. Walker. "Principles of Physics", Wiley (Indian Edition), 2015.
5. N. Garcia, A. Damask and S. Schwarz. "Physics for Computer Science Students", Springer-Verlag, 2012.

CO – PO – PSO MAPPING:

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

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

24CY0101	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

UNIT I	WATER AND ITS TREATMENT	9

Water: Sources and impurities, Water quality parameters: Definition and significance of-colour, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, flouride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

UNIT II	NANOCHEMISTRY	9

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, Nano rod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

UNIT III	PHASE RULE AND COMPOSITES	9

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process. Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

UNIT IV	FUELS AND COMBUSTION	9

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil

- cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon foot print.

UNIT V	ENERGY SOURCES AND STORAGE DEVICES	9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion-battery; Electric vehicles-working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.

CO2: Identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

CO3: Apply the knowledge of phase rule and composites for material selection requirements.

CO4: Understand the importance of quantum physics. Recommend suitable fuels for engineering processes and applications.

CO5: Recognize different forms of energy resources and apply them for suitable applications in energy sectors.

TEXT BOOKS:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.

REFERENCE BOOKS:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.

CO – PO – PSO MAPPING:

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

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

24GE0101	PROBLEM SOLVING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

UNIT I	COMPUTATIONAL THINKING AND PROBLEM SOLVING	9

Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II	DATA TYPES, EXPRESSIONS, STATEMENTS	9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III	CONTROL FLOW, FUNCTIONS, STRINGS	9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV	LISTS, TUPLES, DICTIONARIES	9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT V	FILES, MODULES, PACKAGES	9

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Develop algorithmic solutions to simple computational problems.

CO2: Write simple Python programs using conditionals and looping for solving problems.

CO3: Decompose a Python program into functions.

CO4: Represent compound data using Python lists, tuples, dictionaries etc.

CO5: Read and write data from/to files in Python programs.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press 2021.
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

CO – PO – PSO MAPPING:

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

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

24GE0102	தமிழர் மரபு	L	T	P	C
		1	0	0	1
அலகு 1	மொழி மற்றும் இலக்கியம்			3	
இந்திய மொழிக் குடும்பங்கள் திராவிட மொழிகள் தமிழ் ஒரு செம்மொழி தமிழ் செவ்விவக்கியங்கள் சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை -சங்க இலக்கியத்தில் பகிர்தல் அறம் திருக்குறளில் மேலாண்மைக் கருத்துக்கள் தமிழ்க் காப்பியங்கள். தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் சிற்றிலக்கியங்கள் தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு					
அலகு 2	மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை			3	
நடுகல் முதல் நவீன சிற்பங்கள் வரை ஐம்பொன் சிலைகள் பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் தேர் செய்யும் கலை சுடுமண் சிற்பங்கள் நாட்டுப்புறத் தெய்வங்கள் குமரிமுனையில் திருவள்ளுவர் சிலை இசைக் கருவிகள் வினை, யாழ், நாதஸ்வரம், மிருதங்கம், பறை, தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு					
அலகு 3	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்			3	
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம். தமிழர்களின் விளையாட்டுகள்.					
அலகு 4	தமிழர்களின் திணைக் கோட்பாடுகள்			3	
தமிழகத்தின் தாவரங்களும், விலங்குகளும் தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் தமிழர்கள் போற்றிய அறக்கோட்பாடு சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும். கல்வியும் சங்ககால நகரங்களும் துறை முகங்களும் சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.					
அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு			3	
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு கல்வெட்டுகள், கையெழுத்துப்படிகள் தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.					
					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. 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 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.

24GE0102	HERITAGE OF TAMILS	L	T	P	C
		1	0	0	1

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, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III	FOLK AND MARTIAL ARTS	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 - 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: 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. 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 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.

24GE0103	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

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

LIST OF EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines. The Examination shall not be restricted to the sample experiments listed here.

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

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Develop algorithmic solutions to simple computational problems.

CO2: Implement programs in Python using conditionals and loops for solving problems.

CO3: Deploy functions to decompose a Python program.

CO4: Process compound data using Python data structures.

CO5: Utilize Python packages in developing software applications.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data‘‘, Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

CO – PO – PSO MAPPING:

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

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

24BS0101	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2
PHYSICS LABORATORY		L	T	P	C
(Any Seven Experiments)		0	0	2	1

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:

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus.
4. Uniform bending – Determination of Young's modulus.
5. Laser- Determination of the wave length of the laser using grating.
6. Air wedge - Determination of thickness of a thin sheet/wire.
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle.
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect.
12. Michelson Interferometer.
13. Melde's string experiment.
14. Experiment with lattice dynamics kit.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the functioning of various physics laboratory equipment.

CO2: Use graphical models to analyze laboratory data.

CO3: Use mathematical models as a medium for quantitative reasoning and describing physical reality.

CO4: Access, process and analyze scientific information.

CO5: Solve problems individually and collaboratively.

Rubrics:

(i) CIA

Description	Marks
Pre Lab Test	10
Observation	30
Post Lab Test	10
Record	25
Model exam	25
Total	**100**
CIA = 6(x) / 10	

*x- Student CIA total marks

(ii) ESE

Description	Marks
Aim/Apparatus required	10
Formula	10
Figure/Circuit diagram/Model graph	10
Tabulations/Observation	30
Calculations	20
Result	10
Viva voce	10
Total	**100**
ESE = 4(x) / 10	

*x- Student ESE total marks

CO – PO – PSO MAPPING:

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

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

CHEMISTRY LABORATORY	L	T	P	C
(Any Seven Experiments)	**0**	**0**	**2**	**1**

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters such as acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nano particles.

LIST OF EXPERIMENTS:

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by Argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of sodium /potassium present in water using flame photometer.
10. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
11. Corrosion experiments – weight loss method.
12. Proximate analysis of Coal.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Analyze the quality of water samples with respect to their acidity, hardness and DO.

CO2: Determine the amount of metal ions through volumetric and spectroscopic techniques.

CO3: Analyze and determine the composition of coal and demonstrate the corrosion.

CO4: Learn simple method of synthesis nanoparticles.

CO5: Quantitatively analysis the impurities in solution by Electro analytical techniques.

Rubrics:

(i) CIA

Description	Marks
Pre Lab Test	10
Observation	30
Post Lab Test	10
Record	25
Model exam	25
Total	**100**
CIA = 6(x) / 10	

*x- Student CIA total marks

(ii) ESE

Description	Marks
Aim/Apparatus required	10
Formula	10
Figure/Circuit diagram/Model graph	10
Tabulations/Observation	30
Calculations	20
Result	10
Viva voce	10
Total	**100**
ESE = 4(x) / 10	

*x- Student ESE total marks

CO – PO – PSO MAPPING:

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

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

24HS0102	ENGLISH LABORATORY I	L	T	P	C
		0	0	2	1

OBJECTIVES:

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

UNIT I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	6

Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions (filling out a bank application for example).

UNIT II	NARRATION AND SUMMATION	6

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / Events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings- engaging in small talk- describing requirements and abilities.

UNIT III	DESCRIPTION OF A PROCESS / PRODUCT	6

Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities (large & small)-talking about precautions.

UNIT IV	CLASSIFICATION AND RECOMMENDATIONS	6

Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation.

UNIT V	EXPRESSION	6

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking –making predictions- talking about a given topic-giving opinions-understanding a website-describing processes.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Listen to and comprehend general as well as complex academic information.

CO2: Listen to and understand different points of view in a discussion.

CO3: Speak fluently and accurately in formal and informal communicative contexts.

CO4: Describe products and processes and explain their uses and purposes clearly and accurately.

CO5: Express their opinions effectively in both formal and informal discussions.

ASSESSMENT PATTERN

1. One online / app based assessment to test listening /speaking.
2. End Semester ONLY listening and speaking will be conducted online.
3. Proficiency certification is given on successful completion of listening and speaking internal test and end semester exam.

CO – PO – PSO MAPPING:

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

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

SEMESTER II

24HS0203	PROFESSIONAL ENGLISH II	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To engage learners in meaningful language activities to improve their reading and writing skills.
- To learn various reading strategies and apply in comprehending documents in professional context.
- To help learners understand the purpose, audience, contexts of different types of writing.
- To develop analytical thinking skills for problem solving in communicative contexts.
- To demonstrate an understanding of job applications and interviews for internship and placements.

UNIT I	MAKING COMPARISONS	6

Reading - Reading advertisements, user manuals, brochures; Writing – Professional emails, Email etiquette - Compare and Contrast Essay; Grammar – Mixed Tenses, Prepositional phrases.

UNIT II	EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING	6

Reading - Reading longer technical texts– Cause and Effect Essays, and Letters / emails of complaint, Writing - Writing responses to complaints. Grammar - Active Passive Voice transformations, Infinitive and Gerunds.

UNIT III	PROBLEM SOLVING	6

Reading - Case Studies, excerpts from literary texts, news reports etc. Writing – Letter to the Editor, Checklists, Problem solution essay / Argumentative Essay. Grammar – Error correction; If conditional sentences.

UNIT IV	REPORTING OF EVENTS AND RESEARCH	6

Reading –Newspaper articles; Writing – Recommendations, Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions- use of prepositions.

UNIT V	THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY	6

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Grammar – Numerical adjectives, Relative Clauses.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Compare and contrast products and ideas in technical texts.

CO2: Identify and report cause and effects in events, industrial processes through technical texts.

CO3: Analyze problems in order to arrive at feasible solutions and communicate them in the written format.

CO4: Present their ideas and opinions in a planned and logical manner.

CO5: Draft effective resumes in the context of job search.

TEXT BOOKS:

1. "English for Engineers & Technologists", Orient Blackswan Private Ltd, Department of English, Anna University, 2020.
2. Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN.Shoba, and Dr. Lourdes Joevani, "English for Science & Technology", Department of English, Anna University, Cambridge University Press 2021.

REFERENCE BOOKS:

1. Raman. Meenakshi and Sharma Sangeeta, "Professional English", Oxford university press, New Delhi, 2019.
2. V.N. Arora and Laxmi Chandra, "Improve Your Writing ed.," Oxford Univ. Press, New Delhi, 2001.
3. Dr. V. Chellammal, "Learning to Communicate", Allied Publishers, New Delhi, 2003.
4. Prof. R.C. Sharma & Krishna Mohan, "Business Correspondence and Report Writing", Tata McGrawHill & Co. Ltd., New Delhi, 2001.
5. Krishna Mohan and Meera Bannerji, "Developing Communication Skills", Macmillan India Ltd. Delhi, 1990.

CO – PO – PSO MAPPING:

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

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

24MA0202	ORDINARY DIFFERENTIAL EQUATIONS AND TRANSFORM TECHNIQUES	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To acquaint the students with differential equations which are significantly used in engineering problems.
- To make the students to understand the vector calculus techniques.
- To develop the analytic solutions for partial differential equations used in engineering by Fourier series.
- To acquaint the student with Fourier, transform techniques used in wide variety of situations in which the functions used are not periodic.
- To develop Z-transform techniques in solving difference equations.

UNIT I	ORDINARY DIFFERENTIAL EQUATIONS	9+3

Higher order linear differential equation with constant coefficient - Method of variation of parameters -Homogeneous equations of Euler–Cauchy and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

UNIT II	VECTOR CALCULUS	9+3

Gradient and directional derivative- Divergence and curl-Vector identities – irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral – Area of a curved surface- Volume integral- Green's, Gauss divergence and Stoke's theorem.

UNIT III	FOURIER SERIES	9+3

Dirichlet's conditions–General Fourier series–Odd and even functions – Half-range Sine and Cosine series – Parseval's identity – Computation of harmonics.

UNIT IV	FOURIER TRANSFORMS	9+3

Fourier integral theorem – Fourier transform pair - Fourier sine and cosine transforms – Properties – Transform of elementary functions – Inverse Fourier Transforms - Convolution theorem (without proof) – Parseval's identity.

UNIT V	Z–TRANSFORM AND DIFFERENCE EQUATIONS	9+3

Z-transform – Properties of Z-transform – Initial and final value theorem - Inverse Z-transform – Evaluation of Inverse Z transform using partial fraction method and convolution theorem– Formation of difference equations–Solution of difference equations using Z - transform.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Solve higher order ordinary differential equations which arise in engineering applications.

CO2: Understand the concept of Vector calculus.

CO3: Apply Fourier series techniques in engineering applications.

CO4: Understand the Fourier transforms techniques in solving engineering problems.

CO5: Understand the Z-transforms techniques in solving difference equations.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 45th Edition, New Delhi, 2020.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India Pvt Ltd., New Delhi, 2018.

REFERENCE BOOKS:

1. N. P. Bali and Manish Goyal, "A textbook of Engineering Mathematics", Laxmi Publications, Reprint, 2008.
2. Greenberg M. D., "Advanced Engineering Mathematics", Pearson Education 2nd Edition, 5th Reprint, Delhi, 2009.
3. Jain R. K. and Iyengar S. R. K., "Advanced Engineering Mathematics", Narosa Publications, 5th Edition, New Delhi, 2017.
4. Peter V. O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi, 2012.
5. Ramana B. V. "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

CO – PO – PSO MAPPING:

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

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

24PH0202	ENGINEERING PHYSICS II	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the fundamentals of elasticity, stress-strain relationships, and material deformation under various forces.
- To enable the students to gain knowledge in conductor and semiconductor physics.
- To impart knowledge on the magnetic properties of materials.
- To establish a sound grasp of knowledge on different optical properties of materials, optical displays and applications.
- To instill an understanding of the significance of nanostructures, quantum confinement, and their resulting applications in nanodevices.

UNIT I	PROPERTIES OF MATTER	9

Elasticity- Hooke's law- Relationship between three modulii of elasticity (qualitative) - Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength. Torsional stress and deformations - twisting couple - bending of beams. Bending moment - cantilever: theory and experiment. Uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II	CONDUCTING AND SEMICONDUCTING MATERIALS	9

Classical free electron theory of metals – Expression for electrical conductivity-Thermal conductivity expression – Wiedemann-Franz law –Quantum free electron theory - Postulates-Fermi-Dirac Statistics –Density of energy states. Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors – Carrier concentration in N-type & P-type semiconductors.

UNIT III	MAGNETIC PROPERTIES OF MATERIALS	9

Origin of magnetic moment - magnetic permeability and susceptibility–Magnetic material classification: diamagnetism– paramagnetism–ferromagnetism–Domain theory - Hysteresis curve – Soft and Hard magnetic materials – antiferromagnetism – ferrimagnetism - Magnetic principle in computer data storage –Magnetic hard disc (GMR sensor).

UNIT IV	OPTICAL PROPERTIES OF MATERIALS	9

Classification of optical materials – Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – optical processes in organic semiconductor devices – excitonic state – Electro-optics and nonlinear optics: Modulators and switching devices – plasmonics.

UNIT V	NANOELECTRONIC DEVICES	9

Introduction – quantum confinement – quantum structures: quantum wells, wires and dots – Tunneling – Single electron phenomena: Coulomb blockade – resonant-tunneling diode – single electron transistor –quantum states – classical bits – quantum bits or qubits – photo processes –

spintronics – carbon nanotubes: Properties and applications.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Analyze and apply elasticity concepts to real-world structural and material applications.

CO2: Acquire knowledge on basics of conductor and semiconductor physics and its applications in various devices.

CO3: Illustrate the optical properties and their applications to optical devices.

CO4: Get knowledge on magnetic properties of materials and their applications in data storage.

CO5: Understand and apply quantum concepts and nanostructures in modern electronic and material technologies.

TEXT BOOKS:

1. S. O Pillai, "Solid State Physics", 10th edition, NEW AGE International Publishers, 2022.
2. Hilmi Unlu and Norman. "Progress in Nano scale and Low-Dimensional Materials and Devices", Springer International Publishers.
3. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007.
4. Arumugam M, "Engineering Physics", Anuradha Publishers, 2010.
5. Parag K. Lala, "Quantum Computing: A Beginner's Introduction", McGraw-Hill Education (Indian Edition), 2020.

REFERENCE BOOKS:

1. Charles Kittel, "Introduction to Solid State Physics" Wiley India Edition, 2019.
2. Senthil Kumar G. "Engineering Physics" VRB Publications, 2023.
3. Mani P. "Engineering Physics" Dhanam Publications, 2023.

CO – PO – PSO MAPPING:

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

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

24GE0204	ENVIRONMENTAL SCIENCE AND ENGINEERING	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and their functions.
- To acquire the knowledge about biodiversity and emphasize on the biodiversity of India and its conservation.
- To gain the knowledge about the different types of waste, how to handle them and their environmental impact.
- To learn about the causes effects and control measures of various pollutions and know the individual role in it.
- To learn how environmental issues, such as pollution, climate change and global warming to relate sustainable development.

UNIT I	ECOSYSTEMS	6

Concept of an ecosystem (Abiotic and biotic environment) - structure and function of an ecosystem–Producers-Consumers and decomposers. Energy flow in the ecosystem, (Nutrient cycle in the ecosystem) - Ecological succession - Food Chain - food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystems, Forest ecosystem, Grass land ecosystem, Desert ecosystems aquatic ecosystems [ponds, streams, lakes, rivers, ocean estuaries].

UNIT II	BIODIVERSITY	6

Introduction to biodiversity-genetic, species and ecosystem diversity- value of biodiversity - consumptive use- productive use –social, ethical, aesthetic and option values. India as a mega-diversity nation – hot-spots of biodiversity –threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT III	WASTE MANAGEMENT	6

Municipal solid waste management: Sources, characteristics, collection and transportation, waste processing and disposal (including reuse options, biological methods, energy recovery processes and land filling) Hazardous waste management: Characteristics, generation, fate of materials in the environment, treatment and disposal Management of biomedical waste, plastic waste and E-waste: Sources, generation and characteristics; Waste management practices including storage, collection and transfer

UNIT IV	ENVIRONMENTAL POLLUTION	6

Definition a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution d) Noise pollution-Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in pollution control. Flood Case study

UNIT V	SOCIAL ISSUES AND THE ENVIRONMENT	6

From unsustainable to sustainable development – urban problems related to energy water

conservation, rain water harvesting, watershed management- resettlement and rehabilitation of people; its problem and concerns. Issues and possible solutions: Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Recognize and understand the functions of environment, ecosystems.

CO2: Know the bio diversity and their values and conservation.

CO3: Learn about proper waste disposal and minimize waste.

CO4: Understand the causes, effects of pollution and how to control it.

CO5: Understand the relationship between environment and society.

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushiks "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2016.
3. John Pichtel, "Waste management practices", 2nd edition, Dev publication.
4. Allen, D. T. and Shonnard, D. R., "Sustainability Engineering: Concepts, Design and Case Studies", Prentice Hall.
5. Bradley. A.S, Adebayo, A.O, and Maria, P. "Engineering applications in sustainable design and development", Cengage learning.
6. Dr. Ashutosh Tripathi, "Environment and social issues", publication in 2019.
7. Mackenthun, K. M., "Basic Concepts in Environmental Management", Lewis Publication, London, 1998.

REFERENCE BOOKS:

1. R. K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media. edition, 2010.
2. Cunningham,W. P. Cooper and T.H.Gorhani, Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Yung Tse Hung, lawrence K wang and Nazih K shammas, "Handbook of Environment and waste management", volume 2.
4. Rajagopalan, R, "Environmental Studies From Crisisto Cure", Oxford University Press, Third Edition, 2015.
5. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", Orient Blackswan Pvt.Ltd. 2013.

CO – PO – PSO MAPPING:

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

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

24GE0205	ENGINEERING GRAPHICS	L	T	P	C
		2	0	4	4

OBJECTIVES:

- To draw engineering curves.
- To draw freehand sketch of simple objects.
- To draw orthographic projection of solids and section of solids.
- To draw development of solids.
- To draw isometric and perspective projections of simple solids.

UNIT I	PLANE CURVES AND FREEHAND SKETCHING	6+12

Basic Geometrical constructions, Curves used in engineering practices: Conics - Construction of ellipse, parabola and hyperbola by eccentricity method - Construction of cycloid - construction of involutes of square and circle - Drawing of tangents and normal to the above curves - ortho graphic projection - principles - principle planes-first angle projection-projection of points.

UNIT II	PROJECTION OF POINTS, LINES AND PLANE SURFACE	6+12

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

UNIT III	PROJECTION OF SOLIDS	6+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects - Layout of views- Freehand sketching of multiple views from pictorial views of objects.

UNIT IV	PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES	6+12

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

UNIT V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	6+12

Principles of isometric projection - isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones - combination of two solid objects in simple vertical positions - Perspective projection of simple solids - Prisms, pyramids and cylinders by visual ray method.

TOTAL: 90 PERIODS

COURSE OUTCOMES:

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

CO1: Use BIS conventions and specifications for engineering drawing.

CO2: Construct the conic curves, involutes and cycloid.

CO3: Solve practical problems involving projection of lines.

CO4: Draw the orthographic, isometric and perspective projections of simple solids.

CO5: Draw the development of simple solids.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edit ion, 2019.
2. Gopalakrishna K.R., "Engineering Drawing (Vol. I & II combined)", Subhas Publications, Bangalore, 27th Edition, 2017.
3. Luzzader, Warren. J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

CO – PO – PSO MAPPING:

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

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

24GE0206	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 semiconductor diodes characteristics.
- To educate on the fundamental concepts of transistors.
- To introduce the basics of power system.

UNIT I	INTRODUCTION TO DC & AC CIRCUITS	9

DC Circuits: Electrical Parameters – Ohm‘s Law - Kirchhoff‘s Laws –Independent and Dependent Sources –Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power.

UNIT II	BASIC CONCEPTS OF ELECTRICAL MACHINES	9

Faraday‘s Law - working principle and applications of Transformer – DC motor – types and applications – AC motor, types & applications.

UNIT III	SEMICONDUCTOR DIODES	9

Review of intrinsic & extrinsic semiconductors – Theory of PN junction diode –application of diode – half wave and full wave rectifier - Zener diode and its characteristics – applications.

UNIT IV	TRANSISTORS	9

Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – working of FET & UJT.

UNIT V	BASICS OF POWER SYSTEM	9

Power system structure – Generation, Transmission and Distribution - earthling – methods of earthling, protective devices – switch fuse unit – Miniature circuit breaker – types, safety precaution and First Aid.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Compute the electric circuit parameters for simple problems.

CO2: Explain the working principle and applications of electrical machines.

CO3: Analyze the characteristics of semiconductors.

CO4: Explain the basic concepts of transistors.

CO5: Explain the basic power system structure and protection schemes.

TEXT BOOKS:

1. Kothari DP and I. J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2. S. Salaivahanan, "Digital Electronics", McGraw Hill Education (India) Private Limited, 18th Sept 2018.
3. Sedha R. S., "A textbook book of Applied Electronics", S. Chand & Co., 2008.
4. V K Mehta and Rohit Mehta, "Principles of Electrical Machines", S Chand and Company limited, second edition, 2019.

REFERENCE BOOKS:

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

CO – PO – PSO MAPPING:

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

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

24GE0207	தமிழரும் தொழில்நுட்பமும்	L	T	P	C
		1	0	0	1

அலகு 1	நெசவு மற்றும் பானைத் தொழில்நுட்பம்	3

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

அலகு 2	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 3	உற்பத்தித் தொழில் நுட்பம்	3

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

அலகு 4	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்	3

அணை, ஏரி, குளங்கள், மதகு சோழர்காலக் குமுழித் 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 5	அறிவியல் தமிழ் மற்றும் கணித்தமிழ்	3

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

TOTAL: 15 PERIODS

TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு மக்களும் பண்பாடும். கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் முனைவர் இல சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி-வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு.
4. 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 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.

24GE0207	TAMILS AND TECHNOLOGY	L	T	P	C
		1	0	0	1

UNIT I	WEAVING AND CERAMIC TECHNOLOGY	3

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

UNIT II	DESIGN AND CONSTRUCTION TECHNOLOGY	3

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

UNIT III	MANUFACTURING TECHNOLOGY	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 Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V	SCIENTIFIC TAMIL & TAMIL COMPUTING	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. 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 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.

24GE0208	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To train the students in conducting load tests on electrical machines.
- To gain practical experience in experimentally obtaining the characteristics of electronics devices and rectifiers.

LIST OF EXPERIMENTS:

1. Verification of ohms and Kirchhoff‘s Laws.
2. Study of starter.
3. Speed control on DC Shunt Motor.
4. Load test on DC Series Motor.
5. Load test on Single Phase Transformer.
6. Load Test on Single Phase Induction Motor.
7. Characteristics of PN Diodes.
8. Characteristics of BJT.
9. Characteristics of Zener Diodes.
10. Half wave and Full Wave rectifiers.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Construct the circuit with appropriate connections for the given DC machine/transformer.

CO2: Acquire hands on experience of conducting various tests on induction motors and obtaining their performance indices using standard analytical as well as graphical methods.

CO3: Analyse the characteristics of PN diodes and BJT experimentally.

CO4: Analyse the characteristics of half-wave and full-wave rectifier with and without filters experimentally.

CO5: Understand DC motor starters.

CO – PO – PSO MAPPING:

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

1 – low, 2 – medium, 3 – high, ‘-‘– no correlation

24GE0209	ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

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

GROUP – A (CIVIL & ELECTRICAL)

PART I	CIVIL ENGINEERING PRACTICES	15

PLUMBING WORK:

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

WOOD WORK:

a) Sawing
b) Planning
c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

WOOD WORK STUDY:

a) Studying joints in door panels and wooden furniture.
b) Studying common industrial trusses using models.

PART II	ELECTRICAL ENGINEERING PRACTICES	15

a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket.
b) Staircase wiring.
c) Fluorescent Lamp wiring with introduction to CFL and LED types.
d) Energy meter wiring and related calculations/ calibration.
e) Study of Iron Box wiring and assembly.
f) Study of Fan Regulator. (Resistor type and Electronic type using Diac/Triac/quadrac)

g) Study of emergency lamp wiring/Water heater.

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III	**MECHANICAL ENGINEERING PRACTICES**	**15**

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.
b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.
b) (simple)Drilling.
c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.
b) Assembling a household mixer.
c) Assembling an air conditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations

PART IV	**ELECTRONIC ENGINEERING PRACTICES**	**15**

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone.
b) Assembly and dismantle of LED TV.
c) Assembly and dismantle of computer/ laptop.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

CO2: Wire various electrical joints in common household electrical wire work.

CO3: Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipment‘s; Make a tray out of metal sheet using sheet metal work.

CO4: Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO5: Apply safety protocols and use personal protective equipment (PPE) effectively in all engineering practices.

CO – PO – PSO MAPPING:

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

1 – low, 2 – medium, 3 – high, ‘-‘– no correlation

24HS0204	ENGLISH LABORATORY II	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To analyses concepts and problems and make effective presentations explaining them clearly and precisely.
- To be able to communicate effectively through formal and informal writing.
- To be able to use appropriate language structures to write emails, reports and essays.
- To give instructions and recommendations that are clear and relevant to the context.

UNIT I		6

Speaking-Role Play Exercises Based on Workplace Contexts, - talking about competition discussing progress toward goals-talking about experiences- talking about events in life- discussing past events-Writing: writing emails (formal & semi-formal).

UNIT II		6

Speaking: discussing news stories-talking about frequency-talking about travel problems-discussing travel procedures- talking about travel problems- making arrangements-describing arrangements discussing plans and decisions- discussing purposes and reasons- understanding common technology terms-Writing: - writing different types of emails.

UNIT III		6

Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios- talking about purchasing-discussing advantages and disadvantages- making comparisons- discussing likes and dislikes- discussing feelings about experiences-discussing imaginary scenarios Writing: short essays and reports-formal/semi-formal letters.

UNIT IV		6

Speaking: discussing the natural environment-describing systems-describing position and movement- explaining rules-(example- discussing rental arrangements) - understanding technical instructions-Writing: writing instructions-writing a short article.

UNIT V		6

Speaking: describing things relatively-describing clothing-discussing safety issues (making recommendations) talking about electrical devices-describing controlling actions- Writing: job application (Cover letter + Curriculum vitae)-writing recommendations.

TOTAL: 30 PERIODS

COURSE OUTCOMES:

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

CO1: Speak effectively in group discussions held in a formal/semi-formal contexts.

CO2: Discuss, analyses and present concepts and problems from various perspectives to arrive at suitable solutions.

CO3: Write emails, letters and effective job applications.

CO4: Write critical reports to convey data and information with clarity and precision.

CO5: Give appropriate instructions and recommendations for safe execution of tasks.

REFERENCE BOOKS:

1. Butterfield Jeff, "Soft Skills for Everyone", Cengage Learning: New Delhi, 2015.
2. "Interact English Lab Manual for Undergraduate Students", Orient Blackswan: Hyderabad, 2016.
3. E. Suresh Kumar et al., "Communication for Professional Success", Orient Blackswan: Hyderabad, 2015.
4. Raman, Meenakshi and Sangeeta Sharma, "Professional Communication", Oxford University Press: Oxford, 2014,
5. S. Hariharan et al., "Soft Skills", MJP Publishers: Chennai, 2010.

CO – PO – PSO MAPPING:

CO	PO												PSO		
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1	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
2	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
3	2	2	3	3	1	3	3	3	3	3	3	3	-	-	-
4	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
5	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-

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

SEMESTER III

24MA0305	DISCRETE MATHEMATICS	L	T	P	C
		3	1	0	4

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 combinatory 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	LOGIC AND PROOFS	12

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

UNIT II	COMBINATORICS	12

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

UNIT III	GRAPHS	12

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

UNIT IV	ALGEBRAIC STRUCTURES	12

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

UNIT V	LATTICES AND BOOLEAN ALGEBRA	12

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

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the concepts needed to test the logic of a program.

CO2: Understand and identify the structures on many levels.

CO3: Apply the transform functions of a finite set into another finite set which relates to input and output functions in computer science.

CO4: Analyze of the counting principles.

CO5: Implement the concepts and properties of algebraic structures such as groups, rings and fields.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO - PO - PSO MAPPING:

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

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

24CS5301	DIGITAL PRINCIPLES AND SYSTEM DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To design digital circuits using simplified Boolean functions.
- To analyze and design combinational circuits.
- To analyze and design synchronous and asynchronous sequential circuits.
- To understand Programmable Logic Devices.
- To write HDL code for combinational and sequential circuits

UNIT I	BOOLEAN ALGEBRA AND LOGIC GATES	9

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

UNIT II	COMBINATIONAL LOGIC	9

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

UNIT III	SYNCHRONOUS SEQUENTIAL LOGIC	9

Sequential Circuits - Storage Elements: Latches , Flip-Flops - Analysis of Clocked Sequential Circuits - State Reduction and Assignment - Design Procedure - Registers and Counters - HDL Models of Sequential Circuits.

UNIT IV	ASYNCHRONOUS SEQUENTIAL LOGIC	9

Analysis and Design of Asynchronous Sequential Circuits - Reduction of State and Flow Tables - Race-free State Assignment - Hazards.

UNIT V	MEMORY AND PROGRAMMABLE LOGIC	9

RAM - Memory Decoding - Error Detection and Correction - ROM - Programmable Logic Array - Programmable Array Logic - Sequential Programmable Devices.

TOTAL : 45 PERIODS

COURSE OUTCOMES:

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

CO1: Simplify Boolean functions using KMap.

CO2: Design and Analyze Combinational Circuits.

CO3: Design and Analyze Sequential Circuits.

CO4: Implement designs using Programmable Logic Devices.

CO5: Write HDL code for combinational and Sequential Circuits.

TEXT BOOKS:

1. M. Morris R. Mano, Michael D. Ciletti, “Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog”, 6th Edition, Pearson Education, 2017.

REFERENCE BOOKS:

1. G. K. Kharate, "Digital Electronics", Oxford University Press, 2010.
2. John F. Wakerly, "Digital Design Principles and Practices", Fifth Edition, Pearson Education, 2017.
3. Charles H. Roth Jr, Larry L. Kinney, "Fundamentals of Logic Design", Sixth Edition, C, 2013.
4. Donald D. Givone, "Digital Principles and Design", Tata McGraw Hill, 2003.

CO - PO - PSO MAPPING:

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

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

24CS5302	C PROGRAMMING AND DATA STRUCTURES	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To introduce the basics of C Programming languages.
- To learn the concepts of advanced features of C.
- To understand the concepts of ADT's and linear data structures.
- To know the concepts of non-linear data structures like trees and hashing.
- To understand graph structures and apply graph traversals.

UNIT I	C PROGRAMMING FUNDAMENTALS	9

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

UNIT II	C PROGRAMMING - ADVANCED FEATURES	9

Structures – Union – Enumerated Data Types – Pointers: Pointers to Variables, Arrays and Functions – File Handling – Preprocessor Directives.

UNIT III	LINEAR DATA STRUCTURES	9

Abstract Data Types (ADTs) – List ADT – Array-Based Implementation – Linked List – DoublyLinked Lists – Circular Linked List – Stack ADT – Implementation of Stack – Applications – QueueADT – Priority Queues – Queue Implementation – Applications.

UNIT IV	NON-LINEAR DATA STRUCTURES	9

Trees – Binary Trees – Tree Traversals – Expression Trees – Binary Search Tree – Hashing - Hash Functions – Separate Chaining – Open Addressing – DoubleHashing – Rehashing.

UNIT V	MULTIWAY SEARCH TREES AND GRAPHS	9

Graph ADT - Representations of Graph - Graph Traversals – B Tree – B+ Tree – Bi - Connectivity – Euler Circuits – Topological sort.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Develop C programs for any real world/technical application.

CO2: Apply advanced features of C in solving problems

CO3: Write functions to implement linear and non–linear data structure operations.

CO4: Suggest and use appropriate linear/non–linear data structure operations for solving a Given problem.

CO5: Represent and traverse graphs using standard algorithms.

TEXT BOOK :

1. Yashavant Kanetkar, “Let Us C”, Nineteenth Edition, BPB Publications, 2023.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 1997.

REFERENCE BOOKS:

1. Brian W. Kernighan, Rob Pike, “The Practice of Programming”, Pearson Education, 1999.
2. ReemaThareja, “Programming in C”, Second Edition, Oxford University Press, 2016
3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education,1983.
4. Ellis Horowitz, SartajSahni and Susan Anderson, “Fundamentals of Data Structures”, Galgotia, 2008.

CO - PO - PSO MAPPING:

CO	PO												PSO		
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2	1	2	1	-	2	-	-	-	1	-	1	2	2	2	2
3	2	3	1	-	3	-	-	-	1	-	1	2	2	1	2
4	2	1	-	-	1	-	-	-	2	-	1	2	2	3	1
5	1	2	1	-	2	1	1	-	1	-	1	3	2	2	3

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

24CS5303	OBJECT ORIENTED PROGRAMMING	L	T	P	C
		3	0	0	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 Characteristics - Overview of Java - Data Types, Variables and Arrays - Operators - Control Statements - Programming Structures in Java - Defining classes in Java - Constructors-Methods -Access specifiers - Java Doc comments.

UNIT II	INHERITANCE, PACKAGES AND INTERFACES	9

Inheritance: Basics- Types of Inheritance -Super keyword -Method Overriding - Dynamic Method Dispatch -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-Multithreading.

UNIT IV	I/O, GENERICS, STRING HANDLING	9

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

UNIT V	JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS	9

JAVAFX Events and Controls: Event Basics - Handling Key and Mouse Events. Controls: Checkbox, Toggle Button - Radio Buttons - List View - Combo Box - Choice Box - Text Controls - Scroll Pane. Layouts - Flow Pane - HBox and VBox - Border Pane - Stack Pane - Grid Pane. Menus- Basics - Menu - Menu bars - Menu Item.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Apply the concepts of classes and objects to solve simple problems.

CO2: Develop programs using inheritance, packages and interfaces.

CO3: Make use of exception handling mechanisms and multithreaded model to solve real world problems.

CO4: Build Java applications with I/O packages, string classes, Collections and generics concepts.

CO5: 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 BOOK:

1. 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
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

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

24CS5304	COMPUTER ARCHITECTURE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the basic of Instructions.
- To understand processor and control unit.
- To learn Memory, I/O and Parallel systems.
- To know advanced multi-processor systems.

UNIT I	OVERVIEW & INSTRUCTIONS	9

Eight ideas - Components of a computer system - Technology - Performance - Power wall - Uniprocessors to multiprocessors; Instructions - operations and operands - representing instructions - Logical operations - Case study- ARMv7 and ARMv8.

UNIT II	PROCESSOR AND CONTROL UNIT	9

Basic MIPS implementation - Building datapath - Control Implementation scheme - Pipelining - Pipelined datapath and control - Handling Data hazards& Control hazards - Exceptions- Case study- The ARM Cortex-A8 and Intel Core i7.

UNIT III	PARALLELISM	9

Instruction-level-parallelism - Parallel processing challenges - Flynn's classification - Hardware multithreading - Multicore and Shared Memory Multiprocessors.

UNIT IV	MEMORY AND I/O SYSTEMS	9

Memory hierarchy - Memory technologies - Cache basics - Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

UNIT V	ADVANCED MULTIPROCESSOR SYSTEMS	9

GPU - Clusters, Warehouse Scale Computers, and Other Message-Passing Multiprocessors - Multiprocessor Network Topologies - Cluster Networking - Benchmarks and Performance Models - Case study - Intel Core i7 versus NVIDIA TeslaGPU.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the core principles and components of computer architecture.

CO2: Analyze different types of control design and identify hazards.

CO3: Analyze instruction-level parallelism and hardware support for parallel processing.

CO4: Identify the characteristics of various memory systems and I/O communication.

CO5: Understand multiprocessor systems and analyze performance models using benchmarks.

TEXT BOOKS:

1. David A. Patterson, John L. Hennessy, "Computer Organization and Design, The

Hardware/Software Interface", Fifth Edition, Morgan Kaufmann/Elsevier, 2020.

2. William Stallings, "Computer Organization and Architecture - Designing for Performance", Tenth Edition, Pearson Education, 2016.

REFERENCE BOOKS:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Naraig Manjikian, "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw-Hill, 2012.
2. Morris Mano, "Computer System Architecture", Prentice-Hall of India, 2000.

CO - PO - PSO MAPPING:

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

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

24CS5305	DATA SCIENCE FUNDAMENTALS	L	T	P	C
		3	0	0	3

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 – 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 – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – combining datasets – aggregation and grouping – pivot tables – Time series

UNIT V	DATA VISUALIZATION	9

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

TOTAL: 45 PERIODS

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

CO1: Explain the data science process and basic statistical concepts.

CO2: Summarize and describe data using tables, graphs, and averages.

CO3: Analyze relationships using correlation and regression techniques.

CO4: Manipulate data using NumPy and Pandas.

CO5: Visualize data using Matplotlib, Seaborn, and Basemap.

TEXT BOOKS:

1. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", Manning Publications, 2016. (First two chapters for Unit I).
2. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.
3. Allen B. Downey, "Think Stats: Exploratory Data Analysis in Python", Green Tea Press, 2014.

REFERENCE BOOKS:

1. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016.
2. Sanjeev J. Wagh, Manisha S. Bhende, Anuradha D. Thakare, "Fundamentals of Data Science", CRC Press, 2022.
3. Chirag Shah, "A Hands-On Introduction to Data Science", Cambridge University Press, 2020.
4. Vineet Raina, Srinath Krishnamurthy, "Building an Effective Data Science Practice:A Framework to Bootstrap and Manage a Successful Data Science Practice", Apress, 2021.

CO - PO - PSO MAPPING:

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

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

24CS5306	C PROGRAMMING AND DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To develop applications in C
- To implement linear and non-linear data structures
- To implement file handling and structure-based data storage.
- To understand the different operations of search trees
- To solve problems using trees, graphs, and their traversal algorithms.

LIST OF EXPERIMENTS:

1. Write a program using if-else, switch-case, and loops (for, while, do-while) to perform various numerical operations.
2. Demonstrate the use of macros, #define, #include, and conditional compilation in a C program.
3. Write a C program to swap two variables using call-by-value and call-by-reference (pointers).
4. Develop a program to manage student records using arrays, strings, and structures.
5. Create a program to read from and write to a file, count the number of lines, words, and characters.
6. Implement stack operations (push, pop, display) using arrays and demonstrate its application in expression evaluation.
7. Implement insertion and deletion in singly and circular linked lists.
8. Write programs for queue and priority queue operations using arrays and/or linked lists.
9. Create a binary search tree and implement in-order, pre-order, and post-order traversal.
10. Represent a graph using adjacency matrix/list and perform BFS and DFS.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Write efficient C programs using decision and loop constructs.

CO2: Use pointers, structures, and file operations effectively

CO3: Implement and apply stack, queue, and linked list operations.

CO4: Build and traverse binary trees for structured data access.

CO5: Represent and explore graphs using standard traversal methods

CO - PO - PSO MAPPING:

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

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

24CS5309	OBJECT ORIENTED PROGRAMMING LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

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

LIST OF EXPERIMENTS

1. Develop stack and queue data structures using classes and objects.
2. 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.
3. 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.
4. Solve the above problem using an interface.
5. Implement exception handling and creation of user defined exceptions.
6. 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.
7. Write a program to perform file operations.
8. Develop applications to demonstrate the features of generics classes.
9. Develop applications using JavaFX controls, layouts and menus.
10. Develop a mini project for any application using Java concepts.

TOTAL :60 PERIODS

COURSE OUTCOMES:

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

CO1: Design and develop java programs using object oriented programming concepts.

CO2: Develop simple applications using object oriented concepts such as package, exceptions.

CO3: Create GUIs and event driven programming applications for real world problems.

CO4: Implement multithreading, and generics concepts.

CO5: 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**
1	2	1	2	1	-	-	-	-	1	2	2	2	1	2	2
2	2	1	3	1	-	-	-	-	2	3	3	2	1	3	3
3	2	2	1	2	1	-	-	-	1	2	1	3	2	3	3
4	2	2	1	3	-	-	-	-	3	1	1	1	2	1	1
5	1	3	3	1	3	-	-	-	1	1	1	1	2	1	1

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

24CS5310	DATA SCIENCE FUNDAMENTALS LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To be able to use python libraries for handling data.
- To develop analytical applications using python.
- To perform data visualization using plots.

LIST OF EXPERIMENTS:

1. Install and explore the core Python libraries (NumPy, SciPy, Pandas, Statsmodels, and Jupyter Notebook) used in data science. Understand their individual roles and how they integrate to support data analysis workflows.
2. Read data from CSV, Excel, and web sources using Pandas. Analyze the Iris dataset to perform basic descriptive statistics and explore data using head(), describe(), and visualization commands.
3. Create and manipulate Pandas DataFrames to perform indexing, slicing, filtering, merging, grouping, and generating pivot tables. Practice handling missing data and computing summary statistics.
4. Analyze univariate characteristics of the Diabetes and Pima Indians datasets. Compute frequency, mean, median, mode, variance, standard deviation, skewness and Kurtosis to summarize individual variables.
5. Perform bivariate and multivariate regression (linear and logistic) on Diabetes and Pima datasets. Build regression models and compare their effectiveness using error metrics and R^2 values across both datasets.
6. Compute correlation coefficients and visualize relationships using scatter plots. Develop regression models and interpret the regression line, standard error of estimate, and R^2 values.
7. Create one-dimensional and multi-dimensional arrays using NumPy. Operate on them using indexing, slicing, aggregations, broadcasting, and Boolean filtering techniques.
8. Clean, transform, and prepare data by merging datasets, handling missing values, and engineering new features. Apply real-world cleaning scenarios for downstream analysis or modeling tasks.
9. Generate and interpret data visualizations using Matplotlib and Seaborn. Plot normal curves, density and contour plots, scatter plots, histograms, and 3D surface charts using UCI datasets.
10. Visualize spatial data on maps using Basemap or Plotly. Draw country or region boundaries, plot values by location, and annotate key geographic features based on a provided dataset.
11. Analyze time-indexed datasets using Pandas. Apply rolling mean, resampling, and trend analysis on datasets such as stock prices or weather data. Visualize patterns using line charts and moving averages.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Apply Python libraries (NumPy, Pandas, SciPy, Statsmodels) to perform data analysis and manipulation.

CO2: Analyze and visualize structured datasets using descriptive statistics and advanced plotting tools.

CO3: Develop and evaluate linear and logistic regression models for real-world datasets.

CO4: Clean, transform, and integrate data from multiple sources for effective analysis.

CO5: Explore temporal and spatial datasets using specialized visualization techniques.

CO - PO - PSO MAPPING:

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

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

SEMESTER IV

24CB7401	DATABASE MANAGEMENT SYSTEMS AND SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of data models, conceptualize and depict a database system using ER diagram.
- To study the principles to be followed to create an effective relational database and write SQL queries to store/retrieve data to/from database systems.
- To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To understand the need of security in Database Management systems.
- To learn how to secure Database Management systems.

UNIT I	RELATIONAL DATABASES	9

Data Models - Relational Data Models - Relational Algebra - Structured Query Language -Entity-Relationship Model - Mapping ER Models to Relations - Distributed Databases - Data Fragmentation -Replication.

UNIT II	DATABASE DESIGN	9

ER Diagrams - Functional Dependencies - Non-Loss Decomposition Functional Dependencies - First Normal Form - Second Normal Form - Third Normal Form - Dependency Preservation - Boyce/ Codd Normal Form- Multi-Valued Dependencies and Fourth Normal Form- Join Dependencies and Fifth Normal Form.

UNIT III	TRANSACTION MANAGEMENT	9

Transaction Concepts-ACID Properties- Serializability -Transaction Isolation Levels-Concurrency Control - Need for Concurrency - Lock-Based Protocols - Deadlock Handling -Recovery System-Failure Classification- Recovery Algorithm.

UNIT IV	DATABASE SECURITY	9

Need for database security - SQL Injection Attacks - The Injection Technique - SQLi Attack Avenues and Types.

UNIT V	ACCESS CONTROL AND ENCRYPTION	9

Database Access Control - SQL based access definition - Cascading Authorizations - Role-based access control -Inference- Database encryption.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Model an application's data requirements using conceptual modeling and design database schemas based on the conceptual model.

CO2: Formulate solutions to a broad range of query problems using relational algebra/SQL.

CO3: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.

CO4: Run transactions and estimate the procedures for controlling the consequences of concurrent data access.

CO5: Understand how to Secure database systems.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F.Korth, S.Sudharshan, "Database System Concepts", Seventh Edition, Tata McGraw Hill, 2021.
2. Ramez Elmasri, Shamkant B.Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2016.
3. William Stallings, Lawrie Brown, "Computer Security: Principles and Practice", Fourth Edition, Pearson, 2019.

REFERENCE BOOKS:

1. C.J. Date, A. Kannan and S.Swamynathan, "An Introduction to Database Systems", Pearson Education, Eighth Edition, 2006.
2. Raghu Ramakrishnan and Johannes Gehrke, "Database Management Systems ",Third Edition, Mc Graw Hill, 2014.
3. Narain Gehani and Melliyal Annamalai, "The Database Book: Principles and Practice Using the Oracle Database System", Universities Press, 2012.

CO - PO - PSO MAPPING:

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

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

24CB7402	OPERATING SYSTEMS AND SECURITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic concepts of Operating Systems.
- To explore the process management concepts including scheduling, synchronization, threads and deadlock.
- To understand the memory, file and I/O management activities of OS.
- To understand the requirements of a trust model.
- To learn how security is implemented in various operating systems.

UNIT I	OPERATING SYSTEM OVERVIEW	9

Computer - System Organization – Architecture – Operating System Operations - Resource Management - Security and Protection - Distributed Systems - Kernel Data Structures – Operating System Services - System Calls - System Services - Why Applications Are Operating System Specific – Operating System Design and Implementation – Operating System Structure - Building and Booting an Operating System.

UNIT II	PROCESS MANAGEMENT	9

Process Concept-Process Scheduling-Operation on Processes, Inter-process Communication - Threads - Overview - Multithreading models - Threading issues; CPU Scheduling - Scheduling criteria, Scheduling algorithms; Process Synchronization- critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

UNIT III	MEMORY MANAGEMENT AND FILE SYSTEMS	9

Main Memory - Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation - Virtual Memory - Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory. Mass Storage system - HDD Scheduling - File concept, Access methods, Directory Structure, Sharing and Protection; File System Structure, Directory implementation, Allocation Methods, Free Space Management.

UNIT IV	SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS	9

Security Goals - Trust and Threat Model - Access Control Fundamentals - Protection System - Reference Monitor- Secure Operating System Definition- Assessment Criteria - Information Flow - Information Flow Secrecy Models - Denning's Lattice Model - Bell La Padula Model -Information Flow Integrity Models - Biba Integrity Model - Low-Water Mark Integrity - Clark-Wilson Integrity.

UNIT V	SECURITY IN OPERATING SYSTEMS	9

UNIX Security - UNIX Protection System - UNIX Authorization - UNIX Security Analysis - UNIX Vulnerabilities - Windows Security - Windows Protection System - Windows Authorization -

Windows Security Analysis - Windows Vulnerabilities - Address Space Layout Randomizations - Retro fitting Security into a Commercial Operating System-Introduction to Security Kernels.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: To gain understanding on the concepts of Operating Systems.

CO2: To acquire knowledge on process management concepts including scheduling, synchronization, threads and deadlock.

CO3: To have understanding on memory, file and I/O management activities of OS.

CO4: To understand security issues in operating systems and appreciate the need for security models.

CO5: To gain exposure to the operating systems security models of WINDOWS and UNIX OS.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", John Wiley & Sons,Inc.,10th Edition,2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.

REFERENCE BOOKS:

1. Morrie Gasser, "Building A Secure Computer System", Van Nostrand Reinhold, NewYork, 1988.
2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing" ,Fifth Edition, Prentice Hall, New Delhi, 2015.
3. William Stallings, "Operating Systems-Internals and Design Principles",9th Edition, Pearson, 2017.
4. Michael Palmer, "Guide to Operating Systems Security", Course Technology-Cengage Learning, NewDelhi, 2008.
5. Mohammad Tehranipoor, Cliff Wang, "Introduction to Hardware, Security and Trust", Springer, 2012.
6. Gary Mc Graw, "Software Security: Building Security In", Addison Wesley software security series, 2005.

CO - PO - PSO MAPPING:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	3	2	1	1	1	1	2	3	2	3	
2	3	3	3	3	2	1	1	1	1	1	2	3	1	2	
3	3	3	3	3	2	2	1	1	1	1	2	3	2	3	
4	3	3	3	3	1	1	1	1	1	1	1	2	1	3	
5	3	3	3	3	1	2	1	1	1	1	1	2	1	2	

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

24AD6303	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To provide students with a strong foundation in the core principles of Artificial Intelligence.
- To equip students with the knowledge and skills to implement adversarial search strategies.
- To cultivate students' proficiency in using lower-order logics for reasoning within AI.
- To prepare students to apply AI planning methods and natural language processing
- To design simple AI applications across various domains, such as chatbots, AI assistants, and expert systems.

UNIT I	INTELLIGENT AGENTS AND SEARCH TECHNIQUES	9

Foundations of AI: Importance of AI, Evolution of AI, Applications of AI – Agents and Environments – The Nature of Environments – The Structure of Agents – Problem Solving by Search – Uninformed Search– Informed State Space Search – Heuristic Search: Greedy – A* Search – Constraint Satisfaction Problems

UNIT II	ADVERSARIAL SEARCH AND KNOWLEDGE REPRESENTATION	9

Game Search - Min-max Search, Heuristic Alpha-Beta Tree Search, Knowledge Representation Issues – Approaches for Knowledge Representation: Simple Relational Knowledge – Inherited Knowledge – Semantic Nets – Frames – Semantic Web – Ontology.

UNIT III	REASONING WITH LOWER ORDER LOGICS	9

Logical Agent – Proposition Logic – Syntax and Semantics – Theorem Proving – Model Checking – Inference in First Order Logic: Forward Chaining – Backward Chaining – Resolution.

UNIT IV	AI PLANNING AND NATURAL LANGUAGE PROCESSING	9

Classical Planning – Types – Partial Order Planning – Graph Plan and SAT Plan – Natural Language Processing Basics: Syntax – Semantics – Introduction to Statistical NLP.

UNIT V	APPLICATIONS IN AI	9

Applications of AI – Chatbot: types, architecture – AI assistants – Recommendation system – Expert systems: medical, commerce, societal application - Autonomous driving - AI in security

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the foundations of AI and apply search techniques

CO2: Implement adversarial search algorithms and techniques.

CO3: Develop the ability to construct and manipulate logical agents.

CO4: Gain proficiency in classical AI planning methods and understand the basics of natural language processing.

CO5: Explore and apply AI concepts to real-world applications.

TEXT BOOKS:

1. Stuart Russell and Peter Norvig, "Artificial Intelligence - A Modern Approach", Fourth Edition, Pearson Education, 2021.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Third Edition, Tata McGraw-Hill Education, 2008.
3. Xufei Huang, *"*Chatbot: Design, Architecture, and Applications*"*, Senior Capstone Thesis, University of Pennsylvania, School of Engineering and Applied Science, May 3, 2021
4. Valavanidis, Athanasios. (2023). "Artificial Intelligence (AI) Applications. The most important technology we ever develop and we must ensure it is safe and beneficial to human civilization", 1. 1-49.

REFERENCE BOOKS:

1. Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013.
2. Mohammad Mustafa Taye, *"*Understanding Semantic Web and Ontologies: Theory and Applications*"*, arXiv preprint arXiv:1006.4567 [cs.AI], June 23, 2010

CO - PO - PSO MAPPING:

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

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

24CS5401	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

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

UNIT I	INTRODUCTION	9

Notion of an Algorithm - Fundamentals of Algorithmic Problem Solving - Important Problem Types -Fundamentals of the Analysis of Algorithm Efficiency.

UNIT II	BRUTE FORCE AND DIVIDE AND CONQUER	9

Brute-Force String Matching - Exhaustive Search. Divide and Conquer Methodology - Multiplication of Large Integers and Strassen's Matrix Multiplication - Closest-Pair and Convex - Hull Problems. Decrease and Conquer - Topological Sorting - Transform and Conquer: Presorting - Heaps and Heap Sort.

UNIT III	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	9

Dynamic programming - Principle of optimality - Change-making problem - Warshall's and Floyd's algorithms - Optimal Binary Search Trees - Knapsack Problem and Memory functions. Greedy Technique - Dijkstra's algorithm - Huffman Trees and codes.

UNIT IV	ITERATIVE IMPROVEMENT	9

The Simplex Method - The Maximum-Flow Problem - Maximum Matching in Bipartite Graphs - The Stable marriage Problem.

UNIT V	LIMITATIONS OF ALGORITHM POWER	9

Lower - Bound Arguments - P, NP, NP- Complete and NP Hard Problems. Backtracking - Branch and Bound - Approximation Algorithms for NP-Hard Problems.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Analyze the efficiency of recursive and non-recursive algorithms.

CO2: Evaluate brute force, divide and conquer, and other algorithmic techniques.

CO3: Solve problems using dynamic programming and greedy methods.

CO4: Use iterative techniques for optimization.

CO5: Solve problems using backtracking and branch-and-bound methods.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO - PO - PSO MAPPING:

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

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

24CS5404	COMPUTER NETWORKS	L	T	P	C
		3	0	2	4

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 TO NETWORKS AND PHYSICAL LAYER	9

Introduction: Networks, Uses of Networks, Network Topology, Transmission Modes - Network Hardware - Transmission technology - Categories of Networks - Network Software - Protocol Hierarchy - Design issues for the layers Services - Reference Model: TCP/IP and OSI - Internet: Architecture of Internet - Physical Layer: Need and Issues, Data Communication, Guided transmission media, Wireless Transmission, Communication Satellites, Multiplexing and Switching.

UNIT II	DATA LINK LAYER	9

DLL: Need and Issues - Error Detection and Correction - Protocol Verification and Data Link Layer protocols - MAC Sub layer - Channel Allocation Problem - Multiple Access Protocols Ethernet - Wireless LANs and VLAN - Data Link Layer Switching - Connectivity Devices - Configuration of Switches, Wireless Network Security - Wireless Security, IEEE 802.11 Wireless LAN Overview, IEEE 802.11i Wireless LAN Security

UNIT III	NETWORK LAYER	9

Network Layer - Need and Issues - Routing algorithms - Congestion Control Algorithms QOS - Network Layer in Internet - Network Addressing - Configuration of Router - ARP and RARP, Network Access Control, Extensible Authentication Protocol, IEEE 802.1X Port-Based Network Access Control.

UNIT IV	TRANSPORT LAYER	9

Transport Layer - Need and Issues - Transport service - Elements of Transport Protocols - Simple Transport Protocol - TCP and UDP, Transport-Level Security - Secure Sockets Layer, Transport Layer Security, and Secure Shell (SSH).

UNIT V	APPLICATION LAYER	9

Application Layer - Need and Issues DNS - Electronic Mail FTP HTTP WWW, HTTPS, DHCP Security, Web Security.

THEORY : 45 PERIODS

PRACTICAL EXERCISES : 30 PERIODS

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 analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like: a) Echo client and echo server b) Chat.
4. Simulation of DNS using UDP sockets.
5. Use a tool like Wireshark to capture packets and examine the packets.
6. Write a code simulating ARP /RARP protocols.
7. Simulation of Congestion Control Algorithms.
8. Simulation of Distance Vector/ Link State Routing algorithm.
9. Simulation of an error correction code (like CRC).

TOTAL: 75 PERIODS

COURSE OUTCOMES:

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

CO1: Explain the basic layers and its functions in computer networks.

CO2: Understand the basics of how data flows from one node to another.

CO3: Analyze routing algorithms.

CO4: Describe protocols for various functions in the network.

CO5: Analyze the working of various application layer protocols

TEXT BOOKS:

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

REFERENCE BOOKS:

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.

CO - PO - PSO MAPPING:

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

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

24CB7403	DATABASE MANAGEMENT SYSTEMS AND SECURITY LABORATORY	L	T	P	C
		0	0	4	2

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 attacks on databases and to learn to defend against the attacks on databases.
- To learn to store and retrieve encrypted data in databases.

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 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 database table.
9. Use SQLi to authenticate as administrator, to get unauthorized access over sensitive data, to inject malicious statements into form field.
10. Write programs that will defend against the SQLi attacks given in the previous exercise.
11. Write queries to insert encrypted data into the database and to retrieve the data using decryption.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Create databases with different types of key constraints.

CO2: Write simple and complex SQL queries using DML and DCL commands.

CO3: Realize database design using 3NF and BCNF.

CO4: Use advanced features such as stored procedures and triggers.

CO5: Secure databases and mitigate attacks on databases.

CO - PO - PSO MAPPING:

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

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

24CB7404	OPERATING SYSTEMS AND SECURITY LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To understand the basic concepts of Operating Systems.
- To explore the process management concepts including scheduling, synchronization, threads and deadlock.
- To understand the memory, file and I/O management activities of OS.
- To understand the requirements of a trust model.
- To learn how security is implemented in various operating systems.

LIST OF EXPERIMENTS

1. Abstract Basics of UNIX commands, Understand and practice Linux permissions, special
    a. permissions and authentication. (various options of chmod, setuid, setgid)
2. Write programs using the following system calls of UNIX operating system.
    a. fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
3. Write C programs to implement the various CPU Scheduling Algorithms.
4. Implementation of Semaphores.
5. Implementation of Shared memory.
6. Bankers Algorithm for Deadlock Detection &Avoidance.
7. Implementation of the following Memory Allocation Methods for fixed partition.
    a. a) First Fit b) Worst Fit c) Best Fit
8. Implementation of the following Page Replacement Algorithms.
    a. a) FIFO b) LRU c) LFU
9. Program to demonstrate the working of Bell LaPadula Model and Biba Integrity Model.
10. Setting up access control lists of files and directories and testing the lists in Linux.
11. Learn to enable and disable address space layout randomization.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: To gain understanding on the concepts of Operating Systems.

CO2: To acquire knowledge on process management concepts including scheduling, synchronization, threads and deadlock.

CO3: To have understanding on memory, file and I/O management activities of OS.

CO4: To understand security issues in operating systems and appreciate the need for security models

CO5: To gain exposure to the operating systems security models of WINDOWS and UNIX OS.

CO - PO - PSO MAPPING:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	3	3	3	2	1	1	1	1	2	3	2	3	2
2	3	3	3	3	2	1	1	1	1	1	2	3	1	2	1
3	3	3	3	3	2	2	1	1	1	1	2	3	2	3	2
4	3	3	3	3	1	1	1	1	1	1	1	2	1	3	1
5	3	3	3	3	1	2	1	1	1	1	1	2	1	2	1

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

24GE0412	SOFT SKILLS I	L	T	P	C
		0	0	4	2

OBJECTIVES:

- To develop students' comprehensive understanding and effective use of English grammar.
- To enhance students' analytical and logical thinking abilities.
- To make sense of problems, develop strategies to find solutions and persevere in solving them.
- To reason, model, and draw conclusion so make decision with mathematical, statistical, and quantitative information.
- To understand the basics in web development.

UNIT I	ENGLISH PHASE I	12

Vocabulary: Synonyms, Antonyms, Grammar: Subject-Verb Agreement, Tenses and Articles, Prepositions and Conjunctions, Speech and Voices, Comprehension: Inferential and Literal Comprehension, Contextual Vocabulary, Comprehension Ordering.

UNIT II	LOGICAL REASONING PHASE I	12

Logical Reasoning - Phase I Deductive Reasoning: Coding Deductive Logic, Directional Sense, Blood Relations, Objective Reasoning, Selection Decision Tables, Puzzles.

UNIT III	QUANTITATIVE REASONING PHASE I	12

Numbers- HCF & LCM of Numbers - Decimal Fractions - Simplification - Square Roots & Cube Roots - Average - Problems on Numbers - Problems on Ages - Surds & Indice.

UNIT IV	NUMERACY SKILLS PHASE I	12

Pipes & Cisterns - Problems on Trains - Boats & Streams - Allegation or Mixture - Simple Interest - Compound Interest -Logarithms - Area -Volume & Surface Areas.

UNIT V	CODING PROFICIENCY PHASE I	12

HTML5 structure and elements - CSS basics, Flexbox, Grid, responsive design - JavaScript - DOM manipulation, event handling - Basic form validation and data handling.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

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

CO1: Develop vocabulary for effective communication and reading skills.

CO2: Build the logical reasoning and quantitative skills.

CO3: Solve various concepts of number systems and their techniques in solving the HCF, LCM Factors and Decimals.

CO4: Solve the problems on pipes and cisterns, simple interest, compound interest, Growth and depreciation.

CO5: Understand the fundamental principles script programming and develop web applications.

TEXT BOOKS:

1. Dr. R S Aggarwal, “A Modern Approach to Verbal and Nonverbal Reasoning”, Revised Editions, S. Chand Publications.
2. Abhijit Guha, “Quantitative Aptitude for Competitive Examinations”, Fourth Edition, McGraw Hill Publications.
3. Vasan Subramanian, “Pro Mern Stack, Full Stack Web App Development with Mongo, Express, React and Node”, Second edition, Apress, 2019.
4. R. Gopalan & V. Rajagopalan, “English for Competitive Examinations”, Second Edition, Shorff Publishers.

REFERENCE BOOKS:

1. U. Mohan Rao, “Quantitative Aptitude for Competitive Examinations”, Scitech Publications Pvt Ltd, India.
2. Dinesh Khattar, “The Pearson Guide to Quantitative Aptitude for Competitive Examinations”, Third Edition, Pearson Education Pvt Ltd, India, 2016.
3. Chris Northwood, “The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer”, Apress, First Edition, 2018.
4. “Logical Reasoning for Competitive Examinations”, Veranda RACE Publications, 2022.
5. “General English for Competitive Examinations”, Veranda Learning Solutions Ltd, Volume-2, 2022.

CO - PO - PSO MAPPING:

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

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