NEHRU INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Autonomous)
An ISO 9001: 2015 and 14001:2015 Certified Institution, Affiliated to Anna University, Chennai
(Approved by AICTE, New Delhi and Recognized by UGC with Section 2(f) and 12(B)
Re-Accredited by NAAC "A+", NBA Accredited UG Courses: AERO & CSE
Nehru Gardens, Thirumalayampalayam, Coimbatore-641 105

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CURRICULUM

B.E. (Computer Science and Engineering)

REGULATION - 2023

PROGRAM OUTCOMES (POs)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one 's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-Long Learning:** Recognize the need for, and have the preparation and ability

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION AND MISSION OF THE INSTITUTION

VISION

Our Vision is to mould the youngsters to acquire sound knowledge in technical and scientific fields to face the future challenges by continuous upgradation of all resources and processes for the benefit of humanity as envisaged by our great leader Pandit Jawaharlal Nehru.

MISSION

- To build a strong centre of learning and research in engineering and technology.
- To facilitate the youth to learn and imbibe discipline, culture and spirituality.
- To produce quality engineers, dedicated scientists and leaders.
- To encourage entrepreneurship.
- To face the challenging needs of the global industries.

VISION AND MISSION OF THE DEPARTMENT

VISION

- To produce highly competent and innovative Computing Professionals to meet the global demands

MISSION

- To impart quality education by creative teaching learning process
- To be technically competent, ethical and socially responsible throughout the professional career
- To inculcate leadership qualities and entrepreneurship culture to meet the global standards

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- Acquire and Apply knowledge in Computer Science, Mathematics, Science and inter-disciplinary engineering principles in order to excel in computer professional career
- Analyze real life problems adapting to new Computing Technologies for professional excellence and ethical attitude in order to provide economically feasible engineering solutions
- Carry out complex engineering problems with best practices exhibiting communication skills, team work and interpersonal skills to enable continued computer professional development through life-long learning

PROGRAM SPECIFIC OUTCOMES (PSOs)

- Professional Skills: Acquaint in-depth knowledge on the basic and advanced computer science domains like Data Sciences, Cryptography, Cloud and Distributed Computing, Neural Networks and Artificial Intelligence
- Entrepreneurship and Successful Career: Apply the standard practices to have successful career path in the field of information and communication technology and entrepreneurship

SCHEME OF EXAMINATION
B.E. / B.Tech. - Computer Science and Engineering
Regulation 2023 - Choice Based Credit System
(Applicable to students admitted from the year 2023 -2024 onwards)

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
I	U23IP100	Induction Programme	-	-	-	-	-	0
THEORY								
I	U23HS101	Professional English – I	HSMC	3	40	60	100	3
I	U23MA102	Matrices and Calculus	BSC	4	40	60	100	4
I	U23PH103	Engineering Physics	BSC	3	40	60	100	3
I	U23CY104	Engineering Chemistry	BSC	3	40	60	100	3
I	U23GE105	Problem Solving and Python Programming	ESC	3	40	60	100	3
I	U23GE106	Heritage of Tamils	HSMC	1	40	60	100	1
PRACTICAL								
I	U23GE117	Problem Solving and Python Programming Laboratory	ESC	4	60	40	100	2
I	U23BS118	Physics and Chemistry Laboratory	BSC	4	60	40	100	2
I	U23GE119	English Laboratory	HSMC	2	60	40	100	1
			TOTAL	27	-	-	-	22

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
II	U23HS201	Professional English – II	HSMC	2	40	60	100	2
II	U23MA202	Numerical Methods and Complex Functions	BSC	4	40	60	100	4
II	U23PH203	Physics for Information Science	BSC	3	40	60	100	3
II	U23CS204	Programming in C	PCC	4	40	60	100	4
II	U23GE205	Basic Electrical and Electronics Engineering	ESC	3	40	60	100	3
II	U23GE206	Tamils and Technology	HSMC	1	40	60	100	1
PRACTICAL								
II	U23CS217	Programming in C Laboratory	PCC	2	60	40	100	1
II	U23GE218	Engineering Practices Laboratory	ESC	2	60	40	100	1
ENHANCEMENT COURSES								
II		Skill Enhancement Course – I	SEC	2	100	-	100	1
II		Value Enhancement Course – I	VEC	2	100	-	100	1
II		Ability Enhancement Course – I	AEC	2	100	-	100	1
			TOTAL	27	-	-	-	22

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
III	U23DM301	Discrete Mathematics	BSC	4	40	60	100	4
III	U23IT302	Computer Organization and Architecture	PCC	3	40	60	100	3
III	U23CS303	Digital Logic Circuits	PCC	3	40	60	100	3
III	U23CS304	Embedded System with ARM	ESC	3	40	60	100	3
III		Mandatory Course – I	MC	3	100	-	100	0
THEORY WITH INTEGRATED LAB								
III	U23IT305	Object Oriented Programming	PCC	4	50	50	100	3
III	U23CS306	Data Structures and Algorithms	PCC	4	50	50	100	3
PRACTICAL								
III	U23CS317	Digital Logic Circuits and Embedded System Laboratory	PCC	2	60	40	100	1
ENHANCEMENT COURSES								
III		Skill Enhancement Course – II	SEC	2	100	-	100	1
III		Ability Enhancement Course –II	AEC	2	100	-	100	1
			TOTAL	30	-	-	-	22

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
IV	U23GE401	Environmental Science and Sustainability	BSC	2	40	60	100	2
IV	U23PL402	Probability Distributions and Linear Algebra	BSC	4	40	60	100	4
IV	U23IT403	Operating Systems	PCC	3	40	60	100	3
IV		Mandatory Course – II	MC	3	100	-	100	0
THEORY WITH INTEGRATED LAB								
IV	U23CS404	Database Practices	PCC	4	50	50	100	3
IV	U23CS405	Internet of Things	PCC	4	50	50	100	3
IV	U23CS406	Computer Networks	PCC	4	50	50	100	3
PRACTICAL								
IV	U23IT417	Operating Systems Laboratory	PCC	2	60	40	100	1
ENHANCEMENT COURSES								
IV		Skill Enhancement Course – III	SEC	2	100	-	100	1
IV		Value Enhancement Course – II	VEC	2	100	-	100	1
			TOTAL	30	-	-	-	21

CURRICULUM
AND
SYLLABUS

B.E - Computer Science and Engineering

Regulation 2023 - Choice Based Credit System

Semester – I

S. No.	Course Code	Course Title	Category	L	T	P	Contact Period	C
1	U23IP100	Induction Programme	-	-	-	-	-	0
THEORY								
2	U23HS101	Professional English – I	HSMC	3	0	0	3	3
3	U23MA102	Matrices and Calculus	BSC	3	1	0	4	4
4	U23PH103	Engineering Physics	BSC	3	0	0	3	3
5	U23CY104	Engineering Chemistry	BSC	3	0	0	3	3
6	U23GE105	Problem Solving and Python Programming	ESC	3	0	0	3	3
7	U23GE106	Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICAL								
8	U23GE117	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9	U23BS118	Physics and Chemistry Laboratory	BSC	0	0	4	4	2
10	U23GE119	English Laboratory	HSMC	0	0	2	2	1
			TOTAL	**16**	**1**	**10**	**27**	**22**

Course Code	Title			
U23IP100	**Induction Programme**			
Semester: I	L	T	P	Credits
	-	-	-	0

Course Content

	Description
	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 everyday 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 3 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

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
D. Edison, AP / S&H Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23HS101	PROFESSIONAL ENGLISH - I					
Semester: I	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Higher Secondary Level & Bridge Course					

Course Objectives

1	To enhance the quality of the learners in the communicative and in technical writing.
2	To help the learners to use language effectively in academic and also in career life.
3	To strengthen on student's English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
4	To develop the confidence in learner's ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
5	To apply the language efficiently in expressing their opinions via various media.

Course Category	Humanities, Social Science and Management Course (HSMC)
Development Needs	Global / National

Course Description: The course emphasis the learners to develop their skills in Technical writing and also develop their communication skills.

Course Content

Unit	Description	
I	**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).	
	Contact Periods	**09**
II	**NARRATION AND SUMMATION**: 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.	
	Contact Periods	**09**
III	**DESCRIPTION OF A PROCESS / PRODUCT**: 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).	
	Contact Periods	**09**
IV	**CLASSIFICATION AND RECOMMENDATIONS**: Reading - Newspaper articles; Journal reports - and Non-Verbal Communication (tables, pie charts etc.,). Writing - Note-making / Notetaking (Study skills to be taught, not tested); Writing recommendations; Transferring information from nonverbal (chart, graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.	

	Contact Periods	**09**
V	**EXPRESSION**: 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.	
	Contact Periods	**09**
	Total Periods	**45**

Course Outcomes

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

CO1	Comprehend the need of basics grammar to avoid mistakes while talking and writing in English.	K1
CO2	Read and write with good vocabulary by learning the grammar topics effectively.	K2
CO3	Apply the confidence on learners and make them thorough with rules of the grammar topics for good English language.	K3
CO4	Differentiate the different rules in grammar to speak fluently and accurately in formal and informal communicative contexts.	K3
CO5	Express their opinions effectively in both oral and written medium of communication.	K6

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Text Books	1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition). 2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.
Reference Books	1. Technical Communication – Principles and Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi. 2. A Course Book on Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd. 3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN: 0070264244. 4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House. 5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	3	2	-	2
CO2	1	-	-	-	-	-	-	-	3	2	-	2
CO3	1	-	-	-	-	-	-	-	3	2	-	2
CO4	1	-	-	-	-	-	-	-	3	2	-	2
CO5	1	-	-	-	-	-	-	-	3	2	-	2

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	-	2
CO2	-	2
CO3	-	2
CO4	-	2
CO5	-	2

Course designed by	Verified by
R.Dhy	
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Deepa Associate professor of English (S&H) Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23MA102	MATRICES AND CALCULUS					
Semester: I	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	Higher Secondary Level Bridge Course					

Course Objectives

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

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: Matrix Calculus is a very useful tool that can be used in many engineering problems, to representing the real-world data like the traits of people's population, habits etc., and in the field of computing, matrices are used in message encryption.

Course Content

Unit	Description	
I	**MATRICES:** 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.	
	Contact Periods	**12**
II	**DIFFERENTIAL CALCULUS:** 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.	
	Contact Periods	**12**
III	**FUNCTIONS OF SEVERAL VARIABLES:** 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.	
	Contact Periods	**12**
IV	**INTEGRAL CALCULUS:** 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.	
	Contact Periods	**12**

V	**MULTIPLE INTEGRALS:** 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.	
	Contact Periods	**12**
	Total Periods	**60**

Course Outcomes

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

CO 1	Apply the matrix algebra methods for solving practical problems.	K3
CO 2	Apply differential calculus tools in solving various application problems	K3
CO 3	Apply differential calculus ideas on several variable functions	K3
CO 4	Apply different methods of integration in solving practical problems	K3
CO 5	Understand the multiple integral ideas in solving areas, volumes and other practical problems	K2

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Text Books	1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley, 10th Edition, 2020. 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.

Tools for Assessment (40 Marks)					
CIA I	CIA II	CIA III	Assignment/ Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	1	-	1	-	1
CO2	3	3	2	1	-	-	-	1	-	1	-	1
CO3	3	3	2	1	-	-	-	1	-	1	-	1
CO4	3	3	2	1	-	-	-	1	-	1	-	1
CO5	3	3	2	1	-	-	-	1	-	1	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
K. Ramesh Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Ramesh / Mathematics Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23PH103	ENGINEERING PHYSICS					
Semester: I	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		

Course pre-requisites	Higher Secondary Level

Course Objectives

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

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: Engineering physics provides students with a broad exposure to the basic physical theories underlying engineering. students will complete certain concept in Physics intended to provide a good exposure in various directions in both theoretical and applied Physics.

Course Content

Unit	Description	
I	**MECHANICS:** Multi-particle dynamics: Centre 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.	
		Contact Periods 09
II	**ELECTROMAGNETIC WAVES**: 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.	
		Contact Periods 09
III	**OSCILLATIONS, OPTICS AND LASERS**: 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, CO_2 laser, semiconductor laser – Basic applications of lasers in industry	
		Contact Periods 09
IV	**BASIC QUANTUM MECHANICS:** 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 an infinite potential well: 1D,2D and 3D Boxes – Normalization, probabilities and the correspondence principle.	

	Contact Periods	**09**
V	**APPLIED QUANTUM MECHANICS:** The harmonic oscillator(qualitative) – Barrier penetration and quantum tunnelling (qualitative) – Tunnelling 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.	
	Contact Periods	**09**
	Total Periods	**45**

Course Outcomes

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

CO 1	Understand the importance of mechanics.	K2
CO 2	Express their knowledge in electromagnetic waves.	K2
CO 3	Demonstrate a strong foundational knowledge in oscillations, optics, and lasers.	K1
CO 4	Understand the importance of quantum physics.	K2
CO 5	Comprehend and apply quantum mechanical principles towards the formation of energy bands.	K3

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

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, Physic – 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.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	1	1	-	-	-	-	-	-
CO2	3	3	2	1	2	1	-	-	-	-	-	-
CO3	3	3	2	2	2	1	-	-	-	-	-	1
CO4	3	3	1	1	2	1	-	-	-	-	-	-
CO5	3	3	1	1	2	1	-	-	-	-	-	-

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
[Dr. N. Sathyapriya, Associate professor of Physics, Department of Science & Humanities] Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CY104	ENGINEERING CHEMISTRY					
Semester: I	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Higher Secondary Level					

Course Objectives

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

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: Chemistry is required to solve global problems and issues for future engineering.

Course Content

Unit	Description	
I	**WATER AND ITS TREATMENT:** Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride 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.	
	Contact Periods	**09**
II	**NANOCHEMISTRY**: 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, nanorod, 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.	
	Contact Periods	**09**
III	**PHASE RULE AND COMPOSITES**: 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 (fibre, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.	
	Contact Periods	**09**

IV	**FUELS AND COMBUSTION**: 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. CO2 emission and carbon foot print.
	Contact Periods 09
V	**ENERGY SOURCES AND STORAGE DEVICES**: 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: H2-O2 fuel cell, microbial fuel cell; Super capacitors: Storage principle, types and examples.
	Contact Periods 09
	Total Periods 45

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

CO 1	Infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	K1
CO 2	Identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.	K3
CO 3	Apply the knowledge of phase rule and composites for material selection requirements.	K3
CO 4	Recommend suitable fuels for engineering processes and applications.	K3
CO 5	Recognize different forms of energy resources and apply them for suitable applications in energy sectors.	K4

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

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, "Textbook 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.

	5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/Seminar/ Case study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1	-	1	1	-	-	-	-	1
CO2	2	-	-	-	-	2	2	-	-	-	-	-
CO3	3	1	-	-	-	-	-	-	-	-	-	-
CO4	3	1	1	-	-	1	2	-	-	-	-	-
CO5	3	1	2	1	-	2	2	-	-	-	-	2

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
A. Lakshmi priya / Chemistry Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23GE105	PROBLEM SOLVING AND PYTHON PROGRAMMING					
Semester: I	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	No Prior Programming Experience is Required, A familiarity with High School-Level Algebra is expected					

Course Objectives

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

Course Category	Engineering Science Course (ESC)
Development Needs	Global / National

Course Description: The techniques needed to practice computational thinking, the art of using computers to solve problems and the ways the computers can be used to solve problems.

Course Content

Unit	Description	
I	**COMPUTATIONAL THINKING AND PROBLEM SOLVING:** 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, and guess an integer number in a range, Towers of Hanoi	
	Contact Periods	**09**
II	**DATA TYPES, EXPRESSIONS, STATEMENTS:** 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.	
	Contact Periods	**09**
III	**CONTROL FLOW, FUNCTIONS, STRINGS:** 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 global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as array; Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.	
	Contact Periods	**09**
IV	**LISTS, TUPLES, DICTIONARIES:** 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.	
	Contact Periods	**09**
V	**FILES, MODULES, PACKAGES:** 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).	
	Contact Periods	**09**

	Total Periods	**45**
Course Outcomes **Upon successful completion of the course, students will be able to:**		
CO 1	Solve logical problems through Flowcharts, Algorithms and Pseudo Code.	K2
CO 2	Illustrate the syntax of Python Programming for Solving Problems.	K2
CO 3	Apply the Control Flow Statements and Functions for Solving Searching Techniques.	K3
CO 4	Employ Python Data Structures for Solving Sorting Techniques.	K4
CO 5	Read and Write data from/to files using Python.	K4
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 Scientist s", 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.	

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	-	-	1	1	1	-	1
CO2	3	2	2	3	2	-	-	1	1	1	-	1
CO3	3	3	2	3	2	-	-	1	1	1	-	1
CO4	3	3	2	2	2	-	-	1	1	1	-	1
CO5	2	2	2	2	3	-	-	1	1	1	-	1

3-High; 2-Medium; 1-Low

CO/PO	PSO1	PSO2
CO1	2	1
CO2	2	2
CO3	2	2
CO4	2	2

CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
JEEVANANTHAN G, AP(SG) COMPUTER SCIENCE & ENGINEERING Name and Department of the Faculty Member	Dr. S. SUBASREE, M Tech. Ph.D Professor and Head, Computer Science and Engineering Name and Seal of the Chairperson-BoS Coimbatore TN India

Course Code	Title					
U23GE106	HERITAGE OF TAMILS					
Semester:I	L	T	P	Credits	CIA:40 Marks	ESE: 60 Marks
	1	0	0	1		
Course pre-requisites	Higher Secondary Level					

Course Objectives

1	To learn the extensive literature of classical Tamil.
2	To review the fine arts heritage of Tamil culture.
3	To realize the contribution in Indian freedom struggle.
4	To understand the role of Temple in Sangam cities/ports, Chola conquest.
5	To examine Tamil cultural influence in India.

Course Category	Humanities, Social Science and Management Course (HSMC)
Development Needs	Global/National

Course Description: Used to explores the rich culture, linguistic and historical aspects of the Tamil community.

Course Content

Unit	Description	
I	**LANGUAGE AND LITERATURE**; Language Families in India - Dravidian Languages - Tamil as aClassical 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	
		Contact periods 03
II	**HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE:** 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.	
		Contact periods 03
III	**FOLK AND MARTIAL ARTS:** Therukoothu, Karagattam, VilluPattu, KaniyanKoothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	
		Contact periods 03
IV	**THINAI CONCEPT OF TAMILS:** 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.	
		Contact periods 03
V	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE:** 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.	
		Contact periods 03

	Total Periods	**15**
Course Outcomes **Upon successful completion of the course, students will be able to:**		
CO 1	Remember the extensive literature of tamil and its classical nature, musical instruments, Folk, thinai concept, Indian Freedom Struggle & Aham, Puram and Aram Concept.	K1
CO 2	Remember the principles in Thirukural, Bakthi Literature Azhwars and Nayanmars , heritage of sculpture, painting and musical instruments of ancient people, victory of chozha dynasty.	K1
CO 3	Understand on folk and martial arts of tamil people, Justice in Sangam Literature, Development of Modern literature in Tamil, Making of musical instruments.	K2
CO 4	Understand the role of Temples in Social and Economic Life of Tamils, Ancient Cities and Ports of Sangam Age, Conquest of Cholas.	K2
CO 5	Understand the Cultural Influence of Tamils over the other parts of India, contribution of tamils self-esteem movement and siddha medicine, Print History of Tamil Books.	K2
K1: Remembering; K2: Understanding;K3: Applying;K4: Analyzing;K5: Evaluating; K6: Creating		
Text Books	1. தமிழகவரலாறு – மக்களும்பண்பாடும் – .கே. கேபிள்ளை (வெளியீடு): தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம் 2. கணினித்தமிழ் – முனைவர்இல. சுந்தரம் . (விகடன்பிரசுரம்). 3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறை(வெளியீடு)	
Reference Books	1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print) 2. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies). 3. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies) 4. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) 5. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu) 6. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.	

Tools for Assessment (40 Marks)

CIAI	CIAII	CIAIII	Assignment/Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping												
CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	3	-	2	-	3
CO2	-	-	-	-	-	-	3	3	-	2	-	3
CO3	-	-	-	-	-	-	3	3	-	2	-	3
CO4	-	-	-	-	-	-	3	3	-	2	-	3
CO5	-	-	-	-	-	-	3	3	-	2	-	3

3-High;2-Medium;1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. DEEPALA. A S&H Dept.	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105
Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Course Code	Title					
U23GE117	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY					
Semester: I	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	4	2		
Course pre-requisites	No Prior Programming Experience is Required, A familiarity with High School-Level Algebra is expected.					

Course Objective

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

Course Category	Engineering Science Course (ESC)
Development Needs	Global / National

Course Description: Develop solutions to simple computational problems using Python.

Course Content

LIST OF EXPERIMENTS

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same. (Electricity Billing, Retail shop billing, 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 tools.
12. Developing a game activity using Pygame like bouncing ball, car race etc

Contact Periods	**60**

Course Outcomes

Upon successful completion of the course, Students will be able to:

CO 1	Develop algorithmic solutions to simple computational problems and execute simple python programs.	K2
CO 2	Implement programs in Python using conditionals and loops for solving problems.	K3
CO 3	Deploy functions to decompose a Python program.	K3
CO 4	Process compound data using Python data structures.	K4

CO 5	Utilize Python packages in developing software applications.	K4

K1: Remembering; K2: Understanding; K3: Applying; K4: Analysing; K5: Evaluating; K6: Creating

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculations & Result	Viva-Voce	Total
20	30	40	10	100

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	-	-	1	1	1	-	1
CO2	3	2	2	3	2	-	-	1	1	1	-	1
CO3	3	3	2	3	2	-	-	1	1	1	-	1
CO4	3	3	2	2	2	-	-	1	1	1	-	1
CO5	2	2	2	2	3	-	-	1	1	1	-	1

3 – High 2-Medium 1-Low

CO \ PSO	PSO1	PSO2
CO1	2	1
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
JEEVANANTHAM G, AP(SG) COMPUTER SCIENCE & ENGINEERING Name and Department of the Faculty Member	Dr. S. SUBASREE, M Tech. Ph.D Professor and Head, Computer Science and Engineering Nehru Institute of Engineering and Technology Coimbatore TN India Name and Seal of the Chairperson-BoS

Course Code	Title					
U23BS118	PHYSICS AND CHEMISTRY LABORATORY					
Semester: I	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	4	2		

Course pre-requisites	Higher Secondary Level, Volumetric analysis

Course Objectives

1	To learn the proper use of various kinds of physics laboratory equipment.
2	To learn problem solving skills related to physics principles and interpretation of experimental data.
3	To determine error in physics experimental measurements and techniques used to minimize such error.
4	To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
5	To induce the students to familiarize with synthesis, analytical and electro analytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: An understanding of the importance of direct observation in physics and discriminate between conclusions based on theory and those based on experimental data and in depth understanding of chemistry are needed for the engineer for the more beneficial solutions.

Course Content

PHYSICS LABORATORY

LIST OF EXPERIMENTS (Any Seven)

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.

Contact Periods 30

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS (Any Seven)

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 types and amount of alkalinity in a water sample.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.

7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture of acids using conductivity meter.
10. Conduct metric titration of barium chloride against sodium sulphate (precipitation titration).
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of iron content of the given solution using potentiometer
13. Preparation of nanoparticles (TiO_2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel.
15. Proximate analysis of Coal.

Contact Periods	**30**

Course Outcomes

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

CO 1	Understand the functioning of various physics laboratory equipment.	K2
CO 2	Use graphical models to analyze laboratory data.	K4
CO 3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.	K3
CO 4	Develop a strong foundation on water hardness, alkalinity, dissolved oxygen and its measurement, enabling them to effectively access and manage water quality in various settings.	K4
CO 5	Acquire the necessary knowledge, skills, and attitudes related to the pH, potentiometric, conductometric, analytical and electroanalytical experiments.	K2

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculations & Result	Viva-Voce	Total
20	30	40	10	100

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2	-	-	1	-	-	-	1
CO2	3	2	2	-	2	-	-	1	-	-	-	1
CO3	3	2	2	-	2	-	-	1	-	-	-	1
CO4	3	2	2	-	2	-	-	1	-	-	-	1
CO5	3	2	2	-	2	-	-	1	-	-	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
1. N. Sethupathy 2. A Signature of the Faculty Member	Signature of the Chairperson-BoS
1. Dr. N. Sethupathy, Asp/Physics 2. A. Lakshmi priya/chemistry Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23GE119	ENGLISH LABORATORY					
Semester: I	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		

Course pre-requisites	**Higher Secondary Level**

Course Objectives

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

Course Category	Humanities, Social Science and Management Course (HSMC)
Development Needs	Global / National

Course Description: The course emphasis the learners in getting confidence by encouraging the learners in doing activities to enhance the skills in English language.

Course Content

LIST OF EXPERIMENTS

1. Self-Introduction
2. Introducing a friend
3. Interviews with celebrities
4. Narrating personal experiences
5. Picture description
6. Presenting a product
7. Talking about tasks and progress
8. Talking about travel preparations and transportation
9. Talking about a given topic
10. Debates/ Discussions

Contact Periods	**30**

Course Outcomes

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

CO1	Listen and comprehend general as well as complex academic information.	K2
CO2	Listen and understand different points of view in a discussion.	K5
CO3	Speak fluently and accurately in formal communicative context.	K3
CO4	Speak fluently and accurately in informal communicative context.	K3
CO5	Express their opinions effectively in both formal and informal discussion.	K4

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Performance & Result	Viva-Voce	Total
20	30	40	10	100

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	1	2	3	-	2
CO2	-	-	-	-	-	-	-	1	2	3	-	2
CO3	-	-	-	-	-	-	-	1	2	3	-	2
CO4	-	-	-	-	-	-	-	1	2	3	-	2
CO5	-	-	-	-	-	-	-	1	2	3	-	2

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	-	2
CO2	-	2
CO3	-	2
CO4	-	2
CO5	-	2

Course designed by	Verified by
R. Hhg Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Deepa Asp-(Sel H). Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Semester – II

S. No.	Course Code	Course Title	Category	L	T	P	Contact Period	C
THEORY								
1	U23HS201	Professional English – II	HSMC	2	0	0	2	2
2	U23MA202	Numerical Methods and Complex Functions	BSC	3	1	0	4	4
3	U23PH203	Physics for Information Science	BSC	3	0	0	3	3
4	U23CS204	Programming in C	PCC	4	0	0	4	4
5	U23GE205	Basic Electrical and Electronics Engineering	ESC	3	0	0	3	3
6	U23GE206	Tamils and Technology	HSMC	1	0	0	1	1
PRACTICAL								
7	U23CS217	Programming in C Laboratory	PCC	0	0	2	2	1
8	U23GE218	Engineering Practices Laboratory	ESC	0	0	2	2	1
ENHANCEMENT COURSES								
9		Skill Enhancement Course – I	SEC	0	0	2	2	1
10		Value Enhancement Course – I	VEC	0	0	2	2	1
11		Ability Enhancement Course – I	AEC	0	0	2	2	1
			TOTAL	**16**	**1**	**10**	**27**	**22**

Course Code	Title					
U23HS201	PROFESSIONAL ENGLISH - II					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	2	0	0	2		
Course pre-requisites	Higher Secondary Level, Enhanced in Technical writing to meet the career goal.					

Course Objectives

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

Course Category	Humanities, Social Science and Management Course (HSMC)
Development Needs	Global / National

Course Description: The course emphasis the learners to develop their skills in technical writing and also develop their communication skills.

Course Content

Unit	Description	
I	**MAKING COMPARISONS:** Reading - Reading advertisements, user manuals, brochures; Writing - Professional emails, Email etiquette - Compare and Contrast Essay; Grammar - Mixed Tenses, Prepositional phrases.	
	Contact Periods	06
II	**EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING:** 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.	
	Contact Periods	06
III	**PROBLEM SOLVING**: 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.	
	Contact Periods	06
IV	**REPORTING OF EVENTS AND RESEARCH:** Reading - Newspaper articles; Writing - Recommendations, Transcoding, Accident Report, Survey Report Grammar - Reported Speech, Modals Vocabulary - Conjunctions - use of prepositions.	
	Contact Periods	06
V	**THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY:** 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.	
	Contact Periods	06
	Total Periods	30

Course Outcomes Upon successful completion of the course, students will be able to:		
CO1	Compare and contrast products and ideas in technical texts.	K2
CO2	Identify and report cause and effects in events, industrial processes through technical texts.	K3
CO3	Analyse problems in order to arrive at feasible solutions and communicate them in the written format.	K4
CO4	Apply their ideas and opinions in a planned and logical manner.	K3
CO5	Draft effective resumes in the context of job search.	K3

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Text Books	1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University. 2. English for Science & Technology Cambridge University Press 2021. 3. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. K N. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.
Reference Books	1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press.New Delhi. 2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi. 3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003. 4. Business Correspondence and Report Writing by Prof. R.C. Sharma Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi. 5. Developing Communication Skills by Krishna Mohan, Meera Bannerji-Macmillan India Ltd. 1990, Delhi.

Tools for Assessment

CIA I	CIA II	CIA III	Assignment/ Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	-	-	3	2	-	2
CO2	1	-	-	-	-	-	-	-	3	2	-	2
CO3	1	-	-	-	-	-	-	-	3	2	-	2
CO4	1	-	-	-	-	-	-	-	3	2	-	2
CO5	1	-	-	-	-	-	-	-	3	2	-	2

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	-	2
CO2	-	2
CO3	-	2
CO4	-	2
CO5	-	2

Course designed by	Verified by
R. Hrg Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Rupa Asp- SiH. Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23MA202	NUMERICAL METHODS AND COMPLEX FUNCTIONS					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	Higher Secondary Level Bridge Course, Matrices and Calculus					

Course Objectives

1	To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
2	To introduce the basic concepts of solving algebraic and transcendental equations.
3	To introduce the numerical techniques of interpolation, differentiation and integration which plays an important role in engineering disciplines.
4	To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of the electric current.
5	The various methods of complex analysis can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: The course helps the students to develop the fundamentals and basic concepts in vector calculus, numerical methods and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

Course Content

Unit	Description	
I	**VECTOR CALCULUS:** Introduction of 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 theorems (excluding proofs) – Verification and application in evaluating line, surface and volume integrals.	
	Contact Periods	**12**
II	**SOLUTION OF LINEAR EQUATIONS AND EIGENVALUE PROBLEMS:** Solution of algebraic and transcendental equations – Fixed point iteration method – Newton Raphson method – Solution of linear system of equations – Direct methods: Gauss elimination method – Gauss Jordan method – Pivoting – Iterative methods of Gauss Jacobi and Gauss Seidel – Dominant Eigenvalues of a matrix by Power method.	
	Contact Periods	**12**
III	**INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION:** Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivatives using interpolation polynomials – Single and double numerical integrations using Trapezoidal and Simpson's 1/3 rules.	
	Contact Periods	**12**
IV	**ANALYTIC FUNCTIONS:** Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions w=z+c, az, 1/z, z^2- Bilinear transformation.	
	Contact Periods	**12**

V	**COMPLEX INTEGRATION:** Line integration – Cauchy's integral theorem and Cauchy's integral formula – Taylor's and Laurent's series expansions – Singularity – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle (excluding poles on the real axis).	
	Contact Periods	**12**
	Total Periods	**60**

Course Outcomes

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

CO 1	Apply the concepts of vector calculus in Engineering disciplines.	K3
CO 2	Understand the knowledge of various techniques and methods for solving linear equations and Eigen value problems.	K2
CO 3	Remember the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	K1
CO 4	Understand the knowledge of construction of analytic function and conformal mapping.	K2
CO 5	Understand the techniques of complex variable theory to solve core engineering problems.	K2

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Text Books	1. Veerarajan T, Engineering Mathematics for first year, 3rd edition, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2019. 2. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2017. 3. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
Reference Books	1. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016. 2. Ramana. B.V., "Higher Engineering Mathematics", 1st Edition, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2017. 3. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics" Oxford University Press, 2015. 4. Bali N. P and Manish Goyal, "A Text book of Engineering Mathematics", Eighth Edition, Laxmi Publications Pvt Ltd.,2016.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1	-	-	-	1	-	1	-	1
CO2	2	2	2	1	-	-	-	1	-	1	-	1
CO3	2	2	2	1	-	-	-	1	-	1	-	1
CO4	2	2	2	1	-	-	-	1	-	1	-	1
CO5	2	2	2	1	-	-	-	1	-	1	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
K. Ramesh Signature of the Faculty Member	P. J. Hemalatha Signature of the Chairperson-BoS
Dr.K.Ramesh / Mathematics Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23PH203	PHYSICS FOR INFORMATION SCIENCE					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Basics of Engineering Physics and Properties of Materials					

Course Objectives	
1	To make the students understand the importance in studying electrical properties of materials.
2	To enable the students to gain knowledge in semiconductor physics.
3	To instil knowledge on magnetic properties of materials.
4	To establish a sound grasp of knowledge on different optical properties of materials, optical displays, and applications.
5	To inculcate an idea of significance of nano structures, quantum confinement, ensuing nano device applications and quantum computing.

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: This course is designed to provide a comprehensive understanding of the fundamental principles of physics that underlie information science and technology. The course aims to bridge the gap between traditional physics concepts and their application in the rapidly evolving field of information science.

Course Content

Unit	Description	
I	**ELECTRICAL PROPERTIES OF MATERIALS:** Classical free electron theory - Expression for electrical conductivity - Thermal conductivity, expression - Widemann-Franz law - Success and failures - Electrons in metals - Particle in a three - Dimensional box - Degenerate states - Fermi- Dirac statistics - Density of energy states.	
	Contact Periods	**09**
II	**SEMICONDUCTOR PHYSICS:** Fundamental of Semiconductors - Carrier concentration in intrinsic semiconductors - Extrinsic semiconductors - Variation of carrier concentration with temperature - Variation of Fermi level with temperature and impurity concentration - Hall effect and devices - Ohmic contacts - Schottky diode.	
	Contact Periods	**09**
III	**MAGNETIC PROPERTIES OF MATERIALS:** Fundamental of Magnetic materials - Magnetic material classification: diamagnetism - Para magnetism - Ferromagnetism - Antiferromagnetism - Ferrimagnetism – Ferromagnetism - Domain Theory - M versus H behaviour - Hard and soft magnetic materials - Magnetic principle in computer data storage - Magnetic hard disc (GMR sensor).	
	Contact Periods	**09**
IV	**OPTICAL PROPERTIES OF MATERIALS:** Classification of optical materials - carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators, and semiconductors (concepts only) - photo current in a P-N diode - solar cell - LED -Organic LED - Laser diodes - Optical data storage techniques.	
	Contact Periods	**09**
V	**NANODEVICES AND QUANTUM COMPUTING:** Quantum confinement - quantum structures: quantum wells, wires and dots - Single electron phenomena: Coulomb blockade - resonant-tunnelling diode - single electron transistor - Quantum system for information	

	processing - quantum states - classical bits - quantum bits or qubits - quantum gates - advantage of quantum computing over classical computing.
Contact Periods	**09**
Total Periods	**45**

Course Outcomes

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

CO 1	Gain knowledge on classical and quantum electron theories, and energy band structures.	K2
CO 2	Acquire knowledge on basics of semiconductor physics and its applications in various devices.	K2
CO 3	Get knowledge on magnetic properties of materials and their applications in data storage.	K2
CO 4	Have necessary understanding on the functioning of optical materials for optoelectronics.	K1
CO 5	Understand the basics of quantum structures and their applications and basics of quantum computing.	K2

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6:Creating

Text Books	1. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007. 2. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020. 3. 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. Y.B.Band and Y.Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013. 3. V.V.Mitin, V.A. Kochelap and M.A.Stroscio, Introduction to Nanoelectronics, Cambridge Univ.Press, 2008. 4. G.W. Hanson, Fundamentals of Nanoelectronics, Pearson Education (Indian Edition) 2009. 5. B. Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2014.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/Case study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-
CO3	3	-	-	1	2	1	1	-	-	-	-	-
CO4	3	-	2	1	3	-	1	-	-	-	-	2
CO5	3	2	2	2	2	1	2	-	-	-	-	2

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
[Dr. N. Satheeparaja, Associate professor of Physics, Department of Science & Humanities] Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS204	PROGRAMMING IN C					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	4	0	0	4		

Course pre-requisites	**Basic Knowledge of Programming Knowledge**

Course Objectives	
1	To understand the constructs of C Language.
2	To develop C Programs using Control Structures
3	To develop C programs using arrays and strings
4	To develop applications using functions and pointers
5	To develop applications in C using file Handling Mechanisms

Course Category	Professional Core Course (PCC)
Development Needs	Global

Course Description: Study the constructs of C Language.

Course Content

Unit	Description	
I	**INTRODUCTION TO C PROGRAMMING:** Introduction to Computing: Introduction, Art of Programming through Algorithms and Flowcharts - Overview of C: History and importance of C, Basic structure of C program, executing a C program - Constants, Variable and Data Types: Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to Variables, Defining Symbolic Constants - Managing Input and Output Operations: Reading a Character, Writing a Character, Formatted Input, Formatted Output - Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity	
		Contact Periods 12
II	**CONTROL STRUCTURES: Decision Making and Branching:** Introduction, Decision Making with IF Statement, Simple IF Statement, the IF-ELSE Statement, Nesting of IF-ELSE Statements, The ELSE IF Ladder, The Switch statement, The ? : Operator, The goto statement. **Decision Making and Looping:** Introduction, The while Statement, The do statement, The for statement, Jumps in LOOPS.	
		Contact Periods 12
III	**ARRAYS AND STRINGS: Arrays:** One-dimensional Arrays, Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Example programs- Bubble sort, Selection sort, Linear search, Binary search, Two-dimensional Arrays, Declaration of Two-dimensional Arrays, Initialization of Two-dimensional Arrays, Example programs- Matrix Multiplication, Transpose of a matrix. **Character Arrays and Strings:** Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions)	
		Contact Periods 12
IV	**FUNCTIONS AND POINTERS: User-defined Functions:** Need for functions, Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, No Arguments and no Return Values, Arguments but no Return values, Arguments with Return Values, No Arguments but Returns	

	a Value, Passing Arrays to Functions, Recursion, The Scope, Visibility and Lifetime of variables. **Pointers:** Introduction, Declaring Pointer Variables, Initialization of Pointer variables, accessing a Variable through its Pointer, Pointer Expressions, Pointer Increments and Scale Factor.	
	Contact Periods	**12**
V	**STRUCTURES AND FILE MANAGEMENT:Structures:** Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures.**File Management in C:** Introduction, Defining and opening a file, closing a file, Input/output and Error Handling on Files	
	Contact Periods	**12**
	Total Periods	**60**

Course Outcomes **Upon successful completion of the course, Students will be able to:**		
CO 1	Describe the fundamentals of C programming Language	K2
CO 2	Apply appropriate Control structures to solve problems	K3
CO 3	Apply appropriate Arrays and Strings Concepts to solve Problems	K4
CO 4	Develop applications using Structures and Pointers.	K3
CO 5	Implement functions for performing operations on Files	K2
K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5:Evaluating; K6:Creating		

Text Books	1. E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
Reference Books	1. Yashwant Kanetkar, Let us C, 17th Edition, BPB Publications, 2020. 2. Paul Deitel and Harvey Deitel, "C How to Program with an Introduction to C++", Eighth edition, Pearson Education, 2018. 3. Robert C. Seacord, Effective C, An Introduction to Professional C Programming, No Starch Press, 2020 4. Jeff Szuhay · 2020 Learn C Programming A Beginner's Guide to Learning C Programming the Easy and Disciplined Way, PACKT, 2020

Tools for Assessment

CIA I	CIA II	CIA III	Assignment / Seminar / Case study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	2	1	1	1	2	-	3	2
CO2	2	2	2	1	2	1	1	1	2	-	3	2
CO3	2	3	2	1	2	1	1	1	2	-	3	1
CO4	3	2	2	1	3	1	1	1	2	-	3	2
CO5	2	3	3	1	2	1	2	1	2	-	3	1

3 – High, 2-Medium, 1-Low.

CO\ PSO	PSO1	PSO2
CO1	2	1
CO2	2	2
CO3	2	2

CO4	2	2
CO5	2	1

Course designed by	**Verified by**
Signature of the Faculty Member	Signature of the Chairperson-BoS
JEEVANANTHAM B, AP(SG) COMPUTER SCIENCE & ENGINEERING Name and Department of the Faculty Member	Dr. S. SUBASREE, M Tech. Ph.D Professor and Head, Computer Science and Engineering Nehru Institute of Engineering and Technology Coimbatore-TN, India Name and Seal of the Chairperson-BoS

Course Code	Title					
U23GE205	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		

Course pre-requisites	Matrices and Calculus, Engineering Physics

Course Objectives

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

Course Category	Engineering Sciences Course (ESC)
Development Needs	Global / National

Course Description: The course helps the students to develop the fundamentals and basic concepts in Electric circuit analysis, Working Principles of Electrical Machines, Analog/Digital Electronics and functional elements of Measuring. Students will be able to solve problems related to electric circuits' analysis by using Mesh and Nodal analysis.

Course Content

Unit	Description	
I	**ELECTRICAL CIRCUITS:** DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws –Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor	
	Contact Periods	**09**
II	**ELECTRICAL MACHINES:** Construction and Working principle- DC Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, working principle and Applications of Transformer, Induction Motor, Synchronous motor and Alternator.	
	Contact Periods	**09**
III	**ANALOG ELECTRONICS :** Resistor, Inductor and Capacitor in Electronic Circuits-Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode – Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET, IGBT – Types, I-V Characteristics and Applications, Rectifier and Inverters.	
	Contact Periods	**09**
IV	**DIGITAL ELECTRONICS**: Review of number systems, binary codes, error detection and correction codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (Simple Problems only).	
	Contact Periods	**09**

V	**MEASUREMENTS AND INSTRUMENTATION:** Functional elements of an instrument, Standards and calibration, Operating Principle, types -PMMC and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT.	
	Contact Periods	**09**
	Total Periods	**45**

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

CO 1	Compute the electric circuit parameters for simple problems.	K3
CO 2	Explain the working principle and applications of electrical machines.	K2
CO 3	Analyze the characteristics of analog electronic devices.	K4
CO 4	Explain the basic concepts of digital electronics.	K2
CO 5	Explain the operating principles of measuring instruments.	K2

K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5: Evaluating; K6: Creating

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

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping												
CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	-	-	-	-	1	-	-	2
CO2	2	2	1	-	-	-	-	-	1	-	-	2
CO3	2	2	1	-	-	-	-	-	1	-	-	2
CO4	2	2	1	-	-	-	-	-	1	-	-	2
CO5	2	2	1	-	-	-	-	-	1	-	-	2

3-High; 2-Medium; 1-Low

CO / PSO	PSO 1	PSO 2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. S. ARUNKUMAR/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Nehru Institute of Engineering & Technology Coimbatore - 641 105. Name and Seal of the Chairperson-BoS

Course Code	Title					
U23GE206	TAMILS AND TECHNOLOGY					
Semester:II	L	T	P	Credits	CIA:40 Marks	ESE: 60 Marks
	1	0	0	1		
Course pre-requisites	Higher Secondary Level					

Course Objectives

1	Explore the historical development of technology in the Tamil region.
2	Examine how traditional Tamil practices and knowledge systems have influenced technological advancements.
3	Promote inclusivity and diversity in the technology sector, encouraging the participation of Tamils in various technological fields.
4	Provide a global perspective on Tamil contributions to technology and the role of Tamils in the global technology landscape.
5	Explore the role of the Tamil language in technology, including the development of software, language processing, and digital content in Tamil.

Course Category	Humanities, Social Science and Management Course (HSMC)
Development Needs	Global/National

Course Description: A course on Tamils and Technology might cover the historical and contemporary contributions of Tamils to the field, exploring advancements, notable figures, and the intersection of Tamil culture with technological developments. Topics could include language technology, computing, and digital innovations, providing a holistic understanding of the Tamils have had on the Technology landscape.

Course Content

Unit	Description	
I	**WEAVING AND CERAMIC TECHNOLOGY:** Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.	
	Contact Periods	03
II	**DESIGN AND CONSTRUCTION TECHNOLOGY:** Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple) – ThirumalaiNayakar Mahal – Chetti Nadu House s, Indo - Saracenic architecture at Madras during British Period.	
	Contact Periods	03
III	**MANUFACTURING TECHNOLOGY:** 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.	
	Contact Periods	03
IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY:** Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry – Wells designed for cattle use – Agriculture and Agro Processing – Knowledge of Sea – Fisheries – Pearl – Conche diving – Ancient Knowledge of Ocean – Knowledge Specific Society.	
	Contact Periods	03

V	**SCIENTIFIC TAMIL & TAMIL COMPUTING:** 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.
	Contact periods 03
	Total Periods 15

Course Outcomes

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

CO 1	Understand the extensive literature of Tamil and its classical nature.	K1
CO 2	Understand the heritage of sculpture, painting and musical instruments of ancient people.	K2
CO 3	Review on folk and martial arts of Tamil people.	K1
CO 4	Realize of Thinai concepts, trade and victory of chozha dynasty.	K1
CO 5	Understand the contribution of Tamils in Indian freedom struggle, self-esteem movement and siddha medicine.	K2

K1: Remembering; K2: Understanding;K3: Applying;K4: Analyzing;K5: Evaluating; K6: Creating

Text Books	1. தமிழக வரலாறு – மக்களும் பண்பாடும்– .கே.கே பிள்ளை. (வெளியீடு): தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம். 2. கணினித்தமிழ் – முனைவர் இல. சுந்தரம் . (விகடன் பிரசுரம்). 3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம். (தொல்லியல்துறை (வெளியீடு). 4. பொருநை- ஆற்றங்கரை நாகரீகம். (தொல்லியல் துறை (வெளியீடு).
Reference Books	1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print). 2. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies). 3. National The Contributions of the Tamils to Indian Culture. (Dr.M.Valarmathi) (Published by: Interl Institute of Tamil Studies) 4. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu. 5. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu). 6. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Tools for Assessment (40 Marks)

CIAI	CIAII	CIAIII	Assignment/Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	1
CO2	2	-	-	-	-	-	-	-	-	-	-	1
CO3	2	-	-	-	-	-	-	-	-	-	-	1
CO4	2	-	-	-	-	-	-	-	-	-	-	1
CO5	2	-	-	-	-	-	-	-	-	-	-	1

3-High;2-Medium;1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. DEEPAK .A. S &H Dept.	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105
Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS217	PROGRAMMING IN C LABORATORY					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	0	0	2	1		
Course pre-requisites	Basic Data structure					

Course Objectives

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

Course Category	Professional Core Course (PCC)
Development Needs	Global

Course Description: Study the constructs of C Language.

Course Content

LIST OF EXPERIMENTS

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

1. I/O statements, operators, expressions
2. Decision-making constructs: if-else, goto, switch-case, break-continue
3. Loops: for, while, do-while
4. Arrays: 1D and 2D, multi-dimensional arrays, traversal
5. Strings: operations
6. Functions: call, return, passing parameters by (value, reference), passing arrays to function.
7. Recursion
8. Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
9. Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
10. Files: reading and writing, File pointers, file operations, random access, processor directives.

Numerical Methods:

1. C Program for Gauss Elimination Method
2. C Program for Sum of Taylor Series Program
3. C Program for Trapezoidal Method
4. C Program for Gauss-Jordan Method
5. C Program for Simpson 1/3 Rule

Total Periods	**30**

Course Outcomes

Upon successful completion of the course, Students will be able to:

CO 1	Demonstrate knowledge on C programming constructs.	K2
CO 2	Develop programs in C using basic constructs.	K3
CO 3	Develop programs in C using arrays.	K4
CO 4	Develop applications in C using strings, pointers, functions.	K3
CO 5	Develop applications in C using structures and file processing.	K2

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculations & Result	Viva-Voce	Total
20	30	40	10	100

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	2	1	1	1	2	-	3	2
CO2	2	2	2	1	2	1	1	1	2	-	3	2
CO3	2	3	2	1	2	1	1	1	2	-	3	1
CO4	3	2	2	1	3	1	1	1	2	-	3	2
CO5	2	3	3	1	2	1	2	1	2	-	3	1

3 – High, 2-Medium, 1-Low.

CO\ PSO	PSO1	PSO2
CO1	2	1
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	1

Course designed by	Verified by
G. Jeeva Signature of the Faculty Member	S. Subasree Signature of the Chairperson-BoS
JEEVANANTHAM G, AP(SG) COMPUTER SCIENCE & ENGINEERING Name and Department of the Faculty Member	Dr. S SUBASREE, M Tech. Ph.D Professor and Head. Computer Science and Engineering Nehru Institute of Engineering and Technology Coimbatore-641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23GE218	ENGINEERING PRACTICES LABORATORY					
Semester: II	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	Basics of Measurements, Basics of Simple Drawings					

Course Objectives

1	To draw pipe line plan; laying and connecting various pipe fittings used in common household plumbing work.
2	To weld various joints in steel plates using arc welding work.
3	To machine various simple processes and assemble simple mechanical assembly of common household equipments.
4	To solder and test simple electrical and electronic circuits.
5	To assemble and test simple electronic components on PCB.

Course Category	Engineering Science Course (ESC)
Development Needs	Global / National

Course Description: Engineering practices encompass a range of activities such as problem identification, solution design, model construction, technology utilization, testing and evaluation of solutions, and solution communication.

Course Content

List of Experiments

GROUP A (CIVIL & ELECTRICAL)

Part I

CIVIL ENGINEERING PRACTICES:

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) Laying pipe connection to the suction side and delivery side of a pump.
c) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

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

ELECTRICAL ENGINEERING PRACTICES:

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

GROUP – B (MECHANICAL AND ELECTRONICS)		
Part II	**MECHANICAL ENGINEERING PRACTICES:** 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, Drilling and 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. **ELECTRONIC ENGINEERING PRACTICES:** 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 elements of smart phone. b) Assembly and dismantle of LED TV. c) Assembly and dismantle of computer/ laptop.	
	Total Periods	**30**
Course Outcomes **Upon successful completion of the course, students will be able to:**		
CO 1	Understand the basics of Plumbing and carpentry works	K1
CO 2	Comprehend the basic fabrication process like welding and sheet metal operations	K3
CO 3	Understand the machining operations-Turning/Facing/Step turning, Chamfering & Knurling	K1
CO 4	Differentiate the various types of Electrical wiring and analyze basic parameters of Electrical circuits	K2
CO 5	Demonstrate the basic electronic components and equipment's and acquire knowledge in PCB fabrication and Soldering.	K3
K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5:Evaluating; K6:Creating		

Tools for Assessment (40 Marks)				
Preparation	Conduct of Experiments	Calculations & Result	Viva-Voce	Total
20	30	40	10	100

Tools for Assessment (20 Marks)		
Model Exam 1	Model Exam 2	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	-	-	1	1	1	-	-	-	-	2
CO2	3	1	-	-	1	1	1	-	-	-	-	2
CO3	3	1	-	-	1	1	1	-	-	-	-	2
CO4	3	1	-	-	1	1	1	-	-	-	-	2
CO5	3	1	-	-	1	1	1	-	-	-	-	2

3-High; 2-Medium; 1-Low

CO / PSO	PSO1	PSO2	PSO3
CO 1	2	1	1
CO 2	2	1	1
CO 3	2	1	1
CO 4	2	1	1
CO 5	3	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
A.S. RAJAN, AP(SG), MECHANICAL ENGINEERING Name and Department of the Faculty Member	Dr. M. SANTHOSH Professor and Head Department of Mechanical Engineering Nehru Institute of Engineering and Technology Coimbatore - 641 105, Tamilnadu, India Name and Seal of the Chairperson-BoS

Semester – III

S. No.	Course Code	Course Title	Category	L	T	P	Contact Period	C
THEORY								
1	U23DM301	Discrete Mathematics	BSC	3	1	0	4	4
2	U23IT302	Computer Organization and Architecture	PCC	3	0	0	3	3
3	U23CS303	Digital Logic Circuits	PCC	3	0	0	3	3
4	U23CS304	Embedded System with ARM	ESC	3	0	0	3	3
5		Mandatory Course – I	MC	3	0	0	3	0
THEORY WITH INTEGRATED LAB								
6	U23IT305	Object Oriented Programming	PCC	2	0	2	4	3
7	U23CS306	Data Structures and Algorithms	PCC	2	0	2	4	3
PRACTICAL								
8	U23CS317	Digital Logic Circuits and Embedded System Laboratory	PCC	0	0	2	2	1
ENHANCEMENT COURSES								
9		Skill Enhancement Course - II	SEC	0	0	2	2	1
10		Ability Enhancement Course - II	AEC	0	0	2	2	1
TOTAL				**19**	**1**	**10**	**30**	**22**

Course Code	Title					
U23DM301	DISCRETE MATHEMATICS					
Semester:	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
III	3	1	0	4		
Course pre-requisites	Higher Secondary Level, Bridge Course, Matrices and Calculus					

Course Objectives

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

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: The course helps the students to develop the fundamentals and basic concepts of Logics, Graphs, Structures, Lattices and Boolean Algebra. Students will be able to solve problems related to engineering applications by using these techniques.

Course Content

Unit	Description	
I	**LOGIC AND PROOFS**: Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.	
	Contact Periods	**12**
II	**GRAPH THEORY**: Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.	
	Contact Periods	**12**
III	**ALGEBRAIC STRUCTURES**: Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem.	
	Contact Periods	**12**
IV	**LATTICES AND BOOLEAN ALGEBRA:** Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Some special lattices – Boolean algebra – Properties.	
	Contact Periods	**12**
V	**PROBABILITY AND COMBINATORICS**: Probability axioms, conditional probability, partitions and law of total probability, Bayes theorem. Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Solving linear recurrence relations – Inclusion and exclusion principle.	
	Contact Periods	**12**
	Total Periods	**60**

Course Outcomes Upon successful completion of the course, students will be able to:		
CO 1	Understand the fundamental knowledge of the concepts needed to test the logic of a program.	K2
CO 2	Understand structures on many levels.	K2
CO 3	Understand concepts and properties of algebraic structures such as groups, rings and fields.	K2
CO 4	Apply class of functions which transform a finite set into another finite set which relates to input and output functions in computer science.	K3
CO 5	Understand probability concepts such as the counting principles.	K2
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		

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. 3. Veerarajan, T, "Probability, Statistics, Random Processes and Queuing Theory", 1st Edition, Tata McGraw-Hill, New Delhi, 2019.
Reference Books	1. Grimaldi. R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2013. 2. Koshy.T. "Discrete Mathematics with Applications", Elsevier Publications, 2006. 3. Lipschutz. S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010. 4. Douglas C. Montgomery & George C. Runger, "Applied Statistics and Probability for Engineers ", 7th Edition, John Wiley and Sons, USA, 2018.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	1	-	1	-	1
CO2	3	3	2	1	-	-	-	1	-	1	-	1
CO3	3	3	2	1	-	-	-	1	-	1	-	1
CO4	3	3	2	1	-	-	-	1	-	1	-	1
CO5	3	3	2	1	-	-	-	1	-	1	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Ramesh / Mathematics Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23IT302	COMPUTER ORGANIZATION AND ARCHITECTURE					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Basic Knowledge of Computer Components and its functions					

Course Objectives

1	To analyse and study about basic structure of computers.
2	To apply the basic structure of arithmetic unit.
3	To analyse the basic structure of processing unit.
4	To understand memory system and performance.
5	To apply the concept of various pipelining and I/O interfacing.

Course Category	Program Core Course (PCC)
Development Needs	Global

Course Description: Basic knowledge of Computer components and architecture

Course Content

Unit	Description	
I	**BASIC STRUCTURE OF COMPUTERS:** Functional Units - Basic Operational Concepts- Performance – Instruction Set Architecture: Instructions and Instruction sequencing- Addressing Modes - Basic I/O Operations.	
	Contact Periods	**09**
II	**BASIC ARITHMETIC UNIT:** Addition and Subtraction of Signed Numbers - Design of Fast Adders - Multiplication of Positive Numbers - Signed Operand Multiplication - Fast Multiplication - Integer Division - Floating Point Numbers and Operations.	
	Contact Periods	**09**
III	**BASIC PROCESSING UNIT:** Fundamental Concepts – Instruction Execution – Hardware Components – Instruction Fetch and Execution Steps – Hardwired Control – Micro Programmed Control – Nano Programming.	
	Contact Periods	**09**
IV	**MEMORY SYSTEMS:** Basic Concepts - Speed, Size and Cost - Cache Memories - Performance Considerations - Virtual Memories- memory management requirements	
	Contact Periods	**09**
V	**PIPELINING AND I/O ORGANIZATION:** Basic Concepts - Data Hazards - Instruction Hazards – Influence on instruction sets - Data path and control considerations - Superscalar operation – Accessing I/O devices- Interrupts – Enabling and disabling interrupts- Handling multiple devices - Direct Memory Access. Case study - ARM interrupt structure -Qt Spim	
	Contact Periods	**09**
	Total Periods	**45**

Course Outcomes
Upon successful completion of the course, Students will be able to:

CO 1	Analyze various I/O Operation.	K4
CO 2	Apply Basic concepts of arithmetic unit.	K3
CO 3	Analyse the various hardware components of processing unit.	K4

CO 4	Analyse different types of memory management system.	K4
CO 5	Analyse the characteristics of various pipelining and I/O communications.	K4
K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5:Evaluating; K6:Creating		

Text Books	1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", 5th Edition, McGraw-Hill, 2014. 2. Morris Mano M, "Computer System Architecture", Revised 3rd Edition, Pearson Publication, 2017.
Reference Books	1. John P Hayes, "Computer Architecture and Organization", 3rd Edition, Tata McGraw Hill, 2012. 2. Chakraborty P, "Computer Architecture and Organization", JAICO Publishing House,2010. 3. David A.Patterson and John L.Hennessy, "Computer Organization and Design: The hardware / software interface", 5th Edition, Morgan Kaufmann, 2014. 4. William Stallings, "Computer Organization &Architecture", Pearson Publications, 2022

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2	-	-	-	1	1	2	1
CO2	2	2	1	2	2	-	-	-	1	1	1	2
CO3	2	1	-	1	1	-	-	-	2	1	1	2
CO4	2	2	1	2	2	1	1	-	1	2	1	3
CO5	3	2	2	1	2	-	-	-	1	1	2	2

3 – High 2-Medium 1-Low

CO\ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
N. Rat Signature of the Faculty Member	B. [illegible] Signature of the Chairperson-BoS
Dr. N. RATHINA KUMAR AP (SG) / IT Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS303	DIGITAL LOGIC CIRCUIT					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Basic Knowledge of number systems and logic gates					

Course Objectives	
1	To understand various number systems
2	To apply different methods of boolean function and realize the logic circuits.
3	To analyze logic systems and able to design combinational circuit using karnaugh map.
4	To analyze synchronous sequential circuits.
5	To understand A/D and D/A converters.

Course Category	Program Core Course (PCC)
Development Needs	Global

Course Description: Study advanced concepts of digital logic circuit

Course Content

Unit	Description	
I	**NUMBER SYSTEMS, BOOLEAN ALGEBRA AND LOGIC GATES:** Number Systems: Binary Numbers, Octal and Hexadecimal Numbers and conversions, Complements – Signed Binary Numbers, Binary Codes and Binary Logic.Boolean Algebra and Logic Gates: Theorems and Properties of Boolean Algebra, Boolean functions, Digital Logic Gates and Other Logic Operations.	
	Contact Periods	**09**
II	**GATE LEVEL MINIMIZATION:** The Karnaugh Map Method – Three and Four Variable Maps, Product of Sums (POS) simplification including don't care conditions, Quine-McCluskey (QM) Technique, Introduction to Hardware Description Language.	
	Contact Periods	**09**
III	**COMBINATIONAL LOGIC CIRCUITS:** Introduction to Combinational Circuits, Analysis and Design Procedure, Binary Adder/Subtractor and Decimal Adder, Binary multiplier, Binary magnitude comparator, Decoders Encoders and Priority Encoders, Multiplexers and their applications, Verilog description of combinational logic circuits.	
	Contact Periods	**09**
IV	**SEQUENTIAL LOGIC CIRCUITS:** Introduction to Sequential Circuits, Latches and flip-flops, Analysis Procedure for clocked sequential circuits, State reduction and assignment, Mealy and Moore machines and their design procedure, Registers and shift registers, Ripple and. other Counters, Synchronous Counters, Verilog description of sequential logic circuits.	
	Contact Periods	**09**
V	**MEMORY AND PROGRAMMABLE LOGIC:** Organization of ROM, PLA and PAL and their application in implementing combinational logic circuits.	
	Contact Periods	**09**
	Total Periods	**45**

Course Outcomes Upon successful completion of the course, Students will be able to:		
CO 1	Understand the number systems and their conversions.	K2
CO 2	Apply various Boolean functions using logic gates.	K3

CO 3	Analyze the design procedure of combinational circuits.	K4
CO 4	Apply the canonical and standard forms of Boolean functions using K-map.	K3
CO 5	Analyze various implementation of logic gates.	K4

K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5:Evaluating; K6:Creating

Text Books	1. M. Morris Mano, Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", Sixth Edition, Pearson Education, 2018. 2. Shamsher S Dhillon, "Fundamentals of Digital Logic Design and Computer Organization" Notion Press, 2021
References Books	1. R. P. Jain, Kishor Sarawadekar, "Modern Digital Electronics", McGraw Hill; Standard Edition,2022. 2. Jacob Millman, Christos Halkias, Chetan D. Parikh, Millman's "Integrated Electronics- Analog and Digital Circuit and Systems", McGraw Hill Education, 2nd edition, 2017

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	2	-	-	-	1	1	2	1
CO2	2	2	1	2	2	-	-	-	1	1	1	2
CO3	2	1	-	1	1	-	-	-	2	1	1	2
CO4	2	2	1	2	2	1	1	-	1	2	1	3
CO5	3	2	2	1	2	-	-	-	1	1	2	2

3- High 2-Medium 1- Low

CO\ PSO	PSO1	PSO2
CO1	1	1
CO2	1	-
CO3	-	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr.S.Sivakumar – AP/SG Computer science and Engineering Name and Department of the Faculty Member	Dr. S. SUBASREE, M Tech. Ph.D Professor and Head, Computer Science and Engineering Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS304	EMBEDDED SYSTEMS WITH ARM					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Basic Knowledge of components and functionality of Computers					

Course Objectives

1	To Learn the architecture and programming features of 8086 Microprocessor .
2	To Learn the architecture and programming features of 8051 Microcontroller.
3	To Understand the concepts of embedded system design and analysis.
4	To Understand the real – time processing in an embedded system.
5	To Learn the architecture and programming of ARM processor.

Course Category	Foundation Courses (FC)
Development Needs	Global

Course Description: Study advanced concepts of ARM embedded processor

Unit	Description	
I	**8086 MICROPROCESSOR**: 8086 Architecture-8086 Addressing modes- 8086 Instruction set- 8086 ALP-Interrupts	
	Contact Periods	09
II	**8051 MICROCONTROLLER:** 8051 – Architecture – Addressing Modes – Instruction Set – Program and Data Memory – Stacks – Interrupts – Timers/Counters – Serial Ports –	
	Contact Periods	09
III	**INTRODUCTION TO EMBEDDED SYSTEMS**: Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design	
	Contact Periods	09
IV	**PROCESSES AND OPERATING SYSTEMS**: Multiple tasks and multiple processes, Multirate systems, Preemptive real-time operating systems, Priority based scheduling, Inter-process communication mechanisms, Evaluating operating system performance, Power optimization strategies for processes.	
	Contact Periods	09
V	**LPC2148 ARM PROCESSOR:** LPC 2148 - Salient features, applications, block diagram, memory mapping. Functional features of Interrupt controller, RTC, USB, UART, I2C, Watch dog timer.	
	Contact Periods	09
	Total Periods	45

Course Outcomes
Upon Completion of the course, Students will be able to

CO 1	Understand & Analyse the architecture, instruction set and programming of 8086 Microprocessor.	K4
CO 2	Understand & Analyse the architecture, features and programming of 8051.	K4
CO 3	Understand the features of embedded systems	K2

CO 4	List the concepts of real time operating systems.	K2
CO 5	Understand the architectural features of LPC2148 microcontrollers	K4
K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5:Evaluating; K6:Creating		

Text Book	1. Ray K & Bhurchandi K.M, "Advanced Microprocessors and Peripherals: Architecture, Programming and Interface", 3rd Edition, McGraw Hill, New Delhi, 2012 2. Mohammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D.McKinlay, The 8051 Microcontroller and Embedded Systems Using Assembly and C, Second Edition, Pearson Education, 2008. 3. Marilyn Wolf, Computers as Components – Principles of Embedded Computing System Design, Third Edition, Morgan Kaufmann, 2012. 4. LPC 2148 USER MANUAL
References	1. Yu-Cheng Liu, Glenn A.Gibson, "Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design", Second Edition, Prentice Hall of India, 2007. 2. Kenneth J. Ayala "The 8051 Microcontroller" Cengage Learning India, 2007. 3. William Hohl, Christopher Hinds "ARM Assembly Language Fundamentals and Techniques", Second Edition, 2015.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment / Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	-	-	-	-	1	1
CO2	3	3	2	2	1	-	-	-	-	-	1	1
CO3	3	1	1	1	1	-	-	-	-	-	1	1
CO4	3	1	1	1	1	-	-	-	-	-	1	1
CO5	3	3	2	2	1	-	-	-	-	-	1	1

3-High 2-Medium 1-Low

CO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. S. SIVAKUMAR, AP-SG Computer Science and Engineering Name and Department of the Faculty Member	Dr. S. SUBASREE, M Tech. Ph.D Professor and Head, Computer Science and Engineering Name and Seal of the Chairperson-BoS

Course Code	Title					
U23IT305	OBJECT ORIENTED PROGRAMMING					
Semester: III	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	2	0	2	3		
Course pre-requisites	Fundamentals of Object-Oriented Programming					

Course Objectives

1	To apply object-oriented programming concepts and basics of java programming language
2	To apply the principles of packages, inheritance and interfaces.
3	To analyze the use of threads, exceptions and files.
4	To understand students with GUI based application development and database connectivity
5	To apply the use of dynamic web applications using Servlets and java server pages.

Course Category	Program Core Course (PCC)
Development Needs	Global

Course Description: To study the Java Programming Language

Course Content

Unit	Description	
I	**INTRODUCTION TO OOP AND JAVA:** Overview of OOP – Object oriented programming paradigms – Features of Object-Oriented Programming – JVM - Program Structure, Data types, Java Statements, Type casting in Java programs – Types of Operators.	
		Contact Periods 06
II	**INHERITANCE, PACKAGES AND INTERFACES:** Decision Making statements, Looping statements -Arrays, Strings, Vectors, Wrapper classes – Class, methods, Inheritance, Visibility control, Final Classes, methods and Variables- Interfaces – Interfaces in Java Library – Packages – System Packages, User defined packages.	
		Contact Periods 06
III	**ROBUSTNESS AND CONCURRENCY:** Exception Handling - Exceptions Errors - Types of Exception - Control Flow in Exceptions- - Use of try, catch, finally, throw, throws in Exception Handling - user defined exceptions - Multithreading Thread creation sharing the workload among threads synchronization inter thread communication deadlock.	
		Contact Periods 06
IV	**FILES, GUI PROGRAMMING AND DATABSE CONNECTIVITY:** I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. GUI programming using JavaFX, exploring events, controls and JavaFX menus Accessing databases using JDBC connectivity.	
		Contact Periods 06
V	**SERVLETS AND JAVA SERVER PAGES:** Introduction to servlet - Servlet life cycle - Developing and Deploying Servlets – Exploring. JSP Tags and Expressions - JSP Expression Language (EL) - Using Custom Tag - JSP with Java Bean.	
		Contact Periods 06
		Total Periods 30

LIST OF EXPERIMENTS

1. Write a program to demonstrate the use of multidimensional arrays and looping constructs.
2. Write a program to demonstrate the use of Inheritance.
3. Write a program to demonstrate the application of user-defined packages and sub-packages.

4.Write a program to demonstrate the use of threads in Java.
5.Implement exception handling and creation of user defined exceptions.
6.Write a program to perform file operations.
7.Build a GUI applications using JavaFX.
8.Write a program to register students data using JDBC with MySQL Database.
9.Write a program that uses Servlets to perform basic banking tasks.
10. Write a web application using JSP and demonstrate the use of http request and response methods.
11. Mini Project on JSP through JDBC connectivity

Contact Periods	**30**
Total Periods	**60**

Course Outcomes
Upon successful completion of the course, Students will be able to:

CO 1	Apply the concepts of classes and objects to solve simple problems	K3
CO 2	Apply programs using inheritance, packages and interfaces	K3
CO 3	Analyze the use of exception handling mechanisms and multithreaded model to solve real world problems	K4
CO 4	Analyze the implementation of Java Applications for real world problems involving Database Connectivity	K4
CO 5	Apply dynamic web applications using Servlets and Java Server Page	K3

K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5:Evaluating; K6:Creating

Text Books	1. Herbert Schildt, "Java: The Complete Reference", 12th Edition, McGraw Hill Education, New Delhi, 2022. 2. Herbert Schildt, "Introducing JavaFX 8 Programming", 1st Edition, McGraw Hill Education, New Delhi, 2015.
Reference Books	1. Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11th Edition, Prentice Hall, 2018.

Tools for Assessment - Theory

CIA I	CIA II	CIA III	Assignment / Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Tools for Assessment - Practical

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	3	1	3	-	-	-	3	2	2	2
CO2	2	1	3	2	1	1	-	1	2	1	1	3
CO3	3	3	1	2	2	1	1	1	3	2	1	2
CO4	3	1	2	2	2	-	1	1	1	2	1	3
CO5	1	1	2	3	2	-	1	-	3	2	1	2

3 – High 2-Medium 1-Low

CO\ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1

CO4	1	1
CO5	1	1
Course designed by		**Verified by**
N. R. Signature of the Faculty Member		S. Sivakumar Signature of the Chairperson-BoS
Dr. N. RATHINA KUMAR AP(SG)/IT Name and Department of the Faculty Member		Dr. K. SIVAKUMAR, M.E., Associate Professor & HOD I/c., Department of Information Technology, Nehru Institute of Engineering & Technology, Thirumalayampalayam, Coimbatore-641105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS306	DATA STRUCTURES AND ALGORITHMS					
Semester: III	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	2	0	2	3		
Course pre-requisites	Organizing and problem-solving ability					

Course Objectives

1	To understand the concepts of linear data structures.
2	To analyse various sorting algorithms.
3	To apply balanced search tress, indexing and hashing.
4	To apply graph structures through various algorithms.
5	To understand various algorithm design and analysis techniques.

Course Category	Program Core Course (PCC).
Development Needs	Global

Course Description: To analyze step by step and develop algorithms to solve real world problems.

Course Content

Unit	Description	
I	**LINEAR STRUCTURES:** List ADT: Implementation using arrays, linked list, cursor based linked lists, Doubly-linked lists, applications of lists Stack ADT: Concept and Applications, Queue ADT: Queue, Circular queue, Applications.	
	Contact Periods	**06**
II	**NON-LINEAR DATA STRUCTURES, SORTING:** Tree ADT: Basics, Tree traversals, Binary Tree, expression trees, applications, binary search tree. Sorting: Insertion Sort – Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting	
	Contact Periods	**06**
III	**BALANCED SEARCH TREES, INDEXING & HASHING:** Balanced Search Trees, AVL trees, Binary Heaps, B-Tree. Indexing & hashing: Hash Function – Separate Chaining – Open Addressing	
	Contact Periods	**06**
IV	**GRAPHS:** Definitions – Topological sort – breadth-first traversal - shortest-path algorithms – minimum spanning tree. Prim's and Krûskal's algorithms – Depth-first traversal. Applications of graphs	
	Contact Periods	**06**
V	**ALGORITHM DESIGN AND ANALYSIS:** Greedy algorithms – Divide and conquer – Dynamic programming. Backtracking – Branch and Bound. Algorithm analysis – Asymptotic notations	
	Contact Periods	**06**
	Total Periods	**30**

LIST OF EXPERIMENTS

1. List: Array and linked list implementations
2. Stack: Array and linked list implementations
3. Selection sort, Bubble sort implementation
4. Binary search tree implementations

5. Linear search, Binary search implementation 6. Prim's and Kruskal's algorithms implementation 7. Branch and bound algorithm for traveling salesperson problem implementation 8. Mini Project

Contact Periods	**30**
Total Periods	**60**

Course Outcomes **Upon successful completion of the course, Students will be able to:**		
CO 1	Understand various abstract data types.	K2
CO 2	Apply sorting algorithms.	K3
CO 3	Analyze Tree, Indexing and hashing Techniques.	K4
CO 4	Analyze various tree traversal techniques.	K4
CO 5	Apply design and analysis of various algorithms.	K3

K1:Remembering; K2:Understanding; K3:Applying; K4:Analyzing; K5:Evaluating; K6:Creating

Text Books	1. Michael T. Goodrich (Author), Roberto Tamassia (Author), Michael H. Goldwasser (Author), "Data Structures and Algorithms in Python", Wiley Publications 2021 2. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, "Data Structures Using C", Pearson India, 2009.
Reference Books	1. R. F. Gilberg, B.A. Forouzan, "Data Structures: A Pseudocode approach with C", Second Edition, Cengage India, 2007. 2. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson India, 2009.

Tools for Assessment - Theory

CIA I	CIA II	CIA III	Assignment / Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Tools for Assessment - Practical

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	2	3	1	1	1	1	1	1	3
CO2	1	2	1	2	1	-	1	-	1	1	-	2
CO3	2	3	1	2	2	1	1	-	1	1	1	2
CO4	2	1	-	1	2	-	-	1	1	-	1	3
CO5	1	2	1	2	2	1	1	1	-	-	1	3

3 – High 2-Medium 1-Low

CO\ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1

CO3	1	1
CO4	1	1
CO5	1	1
Course designed by		**Verified by**
Signature of the Faculty Member		Signature of the Chairperson-BoS
Dr. S. SIVAKUMAR, AP-SG1 Computer Science and Engineering. Name and Department of the Faculty Member		Dr. S. SUBASREE, M Tech. Ph.D Professor and Head, Computer Science and Engineering Nehru Institute of Engineering and Technology Coimbatore, TN, India Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS317	DIGITAL LOGIC CIRCUITS AND EMBEDDED SYSTEMS LABORATORY					
Semester: III	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		

Course pre-requisites	Basic Knowledge of components and functionality of Computers

Course Objectives

1	To Understanding Embedded and Digital Logic Fundamentals
2	To apply digital circuits using various tools and technologies
3	To apply microcontrollers using assembly language or high-level languages
4	To Analyze various adders
5	To Analyze various Counters

Course Category	FOUNDATION COURSES (FC)
Development Needs	Global

Course Description: Study advanced concepts of ARM embedded processor

Course Content

LIST OF EXPERIMENTS

1. Programming Arithmetic and Logical Operations in 8051.
2. Generation of Square waveform using 8051.
3. Programming using On – Chip ports in 8051.
4. Programming using Serial Ports in 8051.
5. Study of ARM evaluation system
6. Verification of truth tables of logic gates and theorems of Boolean algebra.
7. Design of half adder, full adder, parallel binary adder and BCD adder.
8. Design of 8 to 1 multiplexer and make use of it to implement a full adder
9. Design of decimal to binary encoder and BCD to decimal decoder
10. Design of 2-bit magnitude comparator.
11. Design of 4-bit ripple up and down counters.
12. Design of 4-bit shift register and ring counter
13. Mini Project

Contact Periods	30

Course Outcomes
Upon Completion of the course, Students will be able to

CO 1	To Learn the architecture and programming features of 8086 Microprocessor.	K2
CO 2	To Learn the architecture and programming features of 8051 Microcontroller.	K4
CO 3	To Understand the concepts of embedded system design and analysis.	K2
CO 4	To Understand the real – time processing in an embedded system.	K4
CO 5	To Learn the architecture and programming of ARM processor.	K2

K1: Remembering K2: Understand K3: Apply K4: Analyze K5: Evaluate K6:Create

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculations & Result	Viva-Voce	Total
20	30	40	10	100

Tools for Assessment (20 Marks)

Model Exam I	Model Exam I	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO1 0	PO1 1	PO12
CO1	3	3	2	2	1	-	-	-	-	-	1	1
CO2	3	3	2	2	1	-	-	-	-	-	1	1
CO3	3	1	1	1	1	-	-	-	-	-	1	1
CO4	3	1	1	1	1	-	-	-	-	-	1	1
CO5	3	3	2	2	1	-	-	-	-	-	1	1

3 – High 2-Medium 1-Low

CO\ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. S. Sivakumar - AP-SG Computer Science and Engineering. Name and Department of the Faculty Member	Dr. S SUBASREE, M Tech, Ph.D Professor and Head, Computer Science and Engineering Nehru Institute of Engineering and Technology Coimbatore TN India Name and Seal of the Chairperson-BoS

Semester – IV

S. No.	Course Code	Course Title	Category	L	T	P	Contact Period	C
THEORY								
1	U23GE401	Environmental Science and Sustainability	BSC	2	0	0	2	2
2	U23PL402	Probability Distributions and Linear Algebra	BSC	3	1	0	4	4
3	U23IT403	Operating Systems	PCC	3	0	0	3	3
4		Mandatory Course – II	MC	3	0	0	3	0
THEORY WITH INTEGRATED LAB								
5	U23CS404	Database Practices	PCC	2	0	2	4	3
6	U23CS405	Internet of Things	PCC	2	0	2	4	3
7	U23CS406	Computer Networks	PCC	2	0	2	4	3
PRACTICAL								
8	U23IT417	Operating Systems Laboratory	PCC	0	0	2	2	1
ENHANCEMENT COURSES								
9		Skill Enhancement Course– III	SEC	0	0	2	2	1
10		Value Enhancement Course – II	VEC	0	0	2	2	1
TOTAL				**17**	**1**	**12**	**30**	**21**

Course Code	Title					
U23GE401	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	2	0	0	2		
Course pre-requisites	Nil					

Course Objectives	
1	To analyse the interrelationship between living organisms and environment.
2	To understand pollutions and its impact on the environment.
3	To enrich the knowledge on themes of natural resources for its management.
4	To understand the waste and its integrated management.
5	To understand and adopt sustainability practices.

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: This course is designed to provide a comprehensive understanding of the fundamental principles of environmental science and engineering that provides an integrated, quantitative, and interdisciplinary approach to the study of environmental systems. The course aims to bridge the gap between environmental science and its application to attain sustainability in future.

Course Content

Unit	Description	
I	**ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY:** **Environment:** Definition, scope and importance of the environment. **Ecosystem:** Definition, structure and function of an ecosystem (Forest ecosystem and River ecosystem) – producers, consumers and decomposers - energy flow in the ecosystem, ecological succession – Case study of simple ecosystem – Pond, river, hill and slopes. **Biodiversity:** Introduction, Definition and Types – values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – threats to biodiversity: habitat loss and poaching of wildlife, case study of man-wildlife conflicts – conservation of biodiversity.	
		Contact Periods 06
II	**POLLUTION AND ITS IMPACT ON ENVIRONMENT:** Pollution: – Definition – causes, effects and control measures of Air pollution - Green house effect- global warming- climate change - ozone layer depletion - acid rain - Carbon Footprint. Climate change on various sectors – Agriculture, forestry and ecosystem – climate change mitigation and adaptation. Action plan on climate change, Role of an individual in prevention of pollution. Case study of disaster management – Flood, earthquake, cyclone and landslide.	
		Contact Periods 06
III	**NATURAL RESOURCES:** **Forest resources**: Use and over-exploitation, deforestation, **Water resources**: Use and overutilization of surface and ground water, drought, Dams benefits and problems, **Food resources**: changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, role of an individual in conservation of natural resources (National and International).	
		Contact Periods 06

IV	**INTEGRATED WASTE MANAGMENT:** Waste - Types and classification. Principles of waste management (5R approach) – Commercial waste, plastic waste, domestic waste, e-waste and biomedical waste - risk management: Collection, segregation, treatment and disposal methods. Waste water treatment.	
	Contact Periods	**06**
V	**SUSTAINABILITY AND ITS PRACTICES:** Sustainability – Concept, needs and Challenges – economic and social aspects of sustainability – Zero waste and R concept, Circular economy. Sustainable habitat: Green buildings, Green materials, energy efficiency, sustainable transports, sustainable energy – Solar energy, wind energy and Hydroelectric power.	
	Contact Periods	**06**
	Total Periods	**30**

Course Outcomes:

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

CO 1	Recall the interrelationship between living organisms and the environment.	K1
CO 2	Understand pollution and its impact on the environment.	K2
CO 3	Understand the significance of various natural resources for its management.	K2
CO 4	Apply the waste and its significance principle for its integrated management.	K2
CO 5	Understand sustainability and adopt sustainability practices.	K4

K1: Remembering; K2: Understanding; K3: Applying;K4: Analyzing;K5: Evaluating; K6: Creating

Text Books	1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004. 2. Dara, S.S & Mishra, D,D "A text book of Environmental Chemistry and Pollution control", S.Chand & Company, New Delhi, 2006. 3. Environmental Chemistry, Sawyer and McCarty, McGraw Hill, New Delhi, 2022.
Reference Books	1. Trivedi.R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media, 3rd edition, BPB publications, 2010. 2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001. 3. Dharmendra S. Sengar, "Environmental law", Prentice Hall of India Pvt Ltd, New Delhi, 2007. 4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005. 5. Erach Bharucha, "Textbook of Environmental Studies", 3rd edition, Universities Press(I) Pvt Ltd, Hyderabad, 2015. 6. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", 15th edition, Cengage Learning India Pvt, Ltd, Delhi, 2014.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/Case study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	1	3	1	2	-	-	1
CO2	2	-	-	-	-	1	3	1	2	-	-	1
CO3	2	-	-	-	-	1	3	1	2	-	-	1
CO4	2	-	-	-	-	1	3	1	2	-	-	1
CO5	2	-	-	-	-	1	3	1	2	-	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
A-Lakshmi. priya/Chemistry Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23PL402	PROBABILITY DISTRIBUTIONS AND LINEAR ALGEBRA					
Semester:	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
IV	3	1	0	4		
Course pre-requisites	Higher Secondary Level, Bridge Course, Matrices and Calculus					

Course Objectives

1	To provide necessary basic concepts in probability and random variables for applications such as random signals, linear systems in engineering.
2	To understand the basic concepts of two dimensional random variables and to introduce some standard properties applicable to engineering which can describe real life phenomenon.
3	To understand the concept of queueing models and apply in engineering. To understand the significance of advanced queueing models.
4	To understand the concepts of vector space, linear transformations, inner product spaces and orthogonalization.
5	To develop the matrix of linear transformation and its eigenvalues and eigenvectors.

Course Category	Basic Science Course (BSC)
Development Needs	Global / National

Course Description: The course helps the students to develop the fundamentals and basic concepts in Probability, Pair of Random Variables, Queueing models. Students will be able to solve problems related to engineering applications by using these techniques.

Course Content

Unit	Description	
I	**PROBABILITY AND RANDOM VARIABLES:** Probability – Axioms of probability – Conditional probability – Baye's theorem – Discrete and continuous random variables – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.	
	Contact Periods	**12**
II	**TWO DIMENSIONAL RANDOM VARIABLES:** Introduction – Joint probability distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables.	
	Contact Periods	**12**
III	**QUEUEING MODELS:** Little's formula – single server models: (M/M/1) : (∞/FIFO) and (M/M/1) : (N/FIFO) – Multi server models: (M/M/C) : (∞/FIFO) and (M/M/C) : (N/FIFO)	
	Contact Periods	**12**
IV	**VECTOR SPACES:** Vector spaces, Subspaces, Basis, Dimension, Linear Transformations – Rotations, Scaling, Shear, Projection Matrices and Properties, Four fundamental subspaces associated with linear transformations.	
	Contact Periods	**12**

V	**INNER PRODUCTS:** Eigenvalues, Eigenvectors, Diagonalization of matrices, Inner products, orthogonal matrices, orthogonal and orthonormal bases, Gram-Schmidt process, QR- factorization, Least square solutions.
	Contact Periods 12
	Total Periods 60

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

CO 1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.	K2
CO 2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.	K2
CO 3	Apply the skills in analysing queuing models	K3
CO 4	Understand the fundamental concepts of probability with a thorough knowledge of standard distributions that can describe certain real-life phenomenon	K2
CO 5	Understand the basic concepts of one and two dimensional random variables and apply them to model engineering problems.	K2

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Text Books	1. Goodaire E., Linear Algebra - Pure and Applied, World Scientific Press, 2013 2. Gilbert Strang, Linear Algebra, 5th Edison, ANE Books, 2016. 3. Gross, D., Shortle, J.F, Thompson, J.M and Harris. C.M., Fundamentals of Queueing Theory, Wiley Student 4th Edition, 2014.
Reference Books	1. Friedberg, A.H., Insel, A.J. and Spence, L., Linear Algebra, Prentice Hall of India, New Delhi, 2004. 2. Lay, D.C., Linear Algebra and its Applications, 5th Ed, Pearson Education, 2015. 3. Kumaresan, S., Linear Algebra A Geometric Approach, Prentice – Hall of India, New Delhi, Reprint, 2010. 4. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", 2nd Edition, John Wiley and Sons, 2002.

Tools for Assessment (40 Marks)

CIA I	CIA II	CIA III	Assignment/ Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	-	1	-	1	-	1
CO2	3	3	2	1	-	-	-	1	-	1	-	1
CO3	3	3	2	1	-	-	-	1	-	1	-	1
CO4	3	3	2	1	-	-	-	1	-	1	-	1
CO5	3	3	2	1	-	-	-	1	-	1	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
K.Ramesh Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. RAMESH / Mathematics Name and Department of the Faculty Member	Head of the Department Department of Science & Humanities Nehru Institute of Engineering & Technology Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23IT403	OPERATING SYSTEMS					
Semester: IV	L	T	P	Credits	CIA:40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Basic Knowledge of Computer Organization and Architecture					

Course Objectives

1	To understand the basics and functions of operating systems.
2	To analyze the various processes, threads and deadlocks
3	To analyze various memory management schemes.
4	To apply various I/O management and file systems.
5	To understand the basics of virtual machines and various Operating Systems.

Course Category	Program Core Course (PCC)
Development Needs	Global

Course Description: To learn about various functions of Operating Systems.

Course Content

Unit	Description	
I	**INTRODUCTION**: Introduction to Operating Systems: Overview – Types of systems – Computer system operations – Hardware Protection – Operating systems services – System calls – System structure – Design and Implementation - Structuring methods- Virtual machines.	
	Contact Periods	**09**
II	**PROCESS MANAGEMENT**: Processes - Process Concept - Process Scheduling - Operations on Processes - Inter-process Communication; CPU Scheduling - Scheduling criteria - Scheduling algorithms: Threads - Multithread Models – Threading issues; Process Synchronization - The Critical-Section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - Monitors; Deadlock - Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.	
	Contact Periods	**09**
III	**MEMORY MANAGEMENT**: Main Memory - Swapping - Contiguous Memory Allocation – Paging - Structure of the Page Table - Segmentation, Segmentation with paging; Virtual Memory -Hardware support for virtual memory (caching, TLB) - Demand Paging – Copy on Write - Page Replacement - Allocation of Frames –Thrashing.	
	Contact Periods	**09**
IV	**STORAGE MANAGEMENT**: Mass Storage system – Disk Structure - Disk Scheduling and Management; File-System Interface - File concept - Access methods - Directory Structure - Directory organization - File system mounting - File Sharing and Protection; File System Implementation - File System Structure - Directory implementation - Allocation Methods - Free Space Management; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem.	
	Contact Periods	**09**
V	**VIRTUAL MACHINES AND MOBILE OS**: Virtual Machines – History, Benefits and Features, Building Blocks, Types of Virtual Machines and their Implementations, Virtualization and Operating-System Components; Case study: Windows, Unix, Linux and Solaris.	

Contact Periods	**09**
Total Periods	**45**

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

CO 1	Understand the various functions of Operating Systems.	K2
CO 2	Analyze different types of scheduling and deadlocks algorithms	K3
CO 3	Apply various memory management techniques	K4
CO 4	Analyze functionality of file systems, I/O systems, and Virtualization	K3
CO 5	Compare iOS and Android Operating Systems	K3

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Text Books	1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc., 2018. 2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition, 2022, New Delhi.
Reference Books	1. Ramaz Elmasri, A. Gil Carrick, David Levine, "Operating Systems – A Spiral Approach", Tata McGraw Hill Edition, 2010. 2. William Stallings, "Operating Systems: Internals and Design Principles", 7th Edition, Prentice Hall, 2018. 3. Achyut S.Godbole, Atul Kahate, "Operating Systems", McGraw Hill Education, 2016.

Tools for Assessment (40 Marks)

CIAI	CIAII	CIAIII	Assignment/Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Mapping

CO\PO	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2	-	-	1	-	-	-	1
CO2	3	2	2	-	2	-	-	1	-	-	-	1
CO3	3	2	2	-	2	-	-	1	-	-	-	1
CO4	3	2	2	-	2	-	-	1	-	-	-	1
CO5	3	2	2	-	2	-	-	1	-	-	-	1

3-High;2-Medium;1-Low

CO \ PSO	PSO1	PSO2
CO1	-	1
CO2	-	1
CO3	-	1
CO4	-	1

CO5	-	1

Course designed by	Verified by
N. Rat Signature of the Faculty Member	S. Sivakumar Signature of the Chairperson-BoS
Dr. N. RATHINA KUMAR AP (SG) / IT Name and Department of the Faculty Member	Dr. K. SIVAKUMAR, M.E.,Ph.D., Associate Professor & HOD I/c., Department of Information Technology, Nehru Institute of Engineering & Technology, Thirumalayampalayam, Coimbatore-641105. Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS404	DATABASE PRACTICES					
Semester: IV	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	2	0	2	3		
Course pre-requisites	Basic Knowledge of Database Concept					

Course Objectives

1	To understand the objective of a database management system
2	To apply various data structures and SQL queries
3	To analyse the basics of transaction processing
4	To apply concurrency control techniques
5	To understand database storage structures and access techniques

Course Category	Program Core Course (PCC)
Development Needs	Global

Course Description: The course examines the principles of design and functions of the Relational Database Management Systems (DBMS). The course emphasizes the use of Relational DBMS as an office productivity tool.

Course Content

Unit	Description
I	**DBMS AN OVERVIEW:** Introduction Overview- Database System vs File System- Database System Concept and Architecture-Data Model Schema and Instances. Data Modeling Using the Entity Relationship Model: ER Model Concepts- Notation for ER Diagram- Introduction to relational databases
	Contact Periods 06
II	**SQL IN DBMS:** Introduction on SQL: Characteristics of SQL, Advantage of SQL. SQl Data Type and Literals. Types of SQL Commands. SQL Operators and Their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL
	Contact Periods 06
III	**DATABASE DESIGNING:** Data Base Design & Normalization Functional dependencies, normal forms, first, second, third normal forms, Join Dependencies and Fifth Normal Form, BCNF, inclusion dependence, normalization using FD, MVD, and JDs, alternative approaches to database design.
	Contact Periods 06
IV	**TRANSACTION:** Transaction Processing Concept Transaction System, Testing of Serializability, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Concurrency Control, Directory System
	Contact Periods 06
V	**IMPLEMENTATION & STORAGE:** RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview

Contact Periods	**06**
Total Periods	**30**

LIST OF EXPERIMENTS

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Write a sql statement for implementing ALTER,UPDATE and DELETE
3. Write the query for implementing the following functions: MAX(),MIN(),AVG(),COUNT()
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Write the queries to implement the joins
8. Usage of Cursors
9. Write the query for creating the users and their role.
10. Perform the following operation for demonstrating the insertion ,updation and deletion using the referential integrity constraints
11. Mini Project

Contact Periods	**30**
Total Periods	**60**

Course Outcomes
Upon Completion of the course, Students will be able to:

CO 1	Understand the fundamentals of DBMS, database design and normal forms.	K2
CO 2	Apply the basics of SQL for retrieval and management of data.	K3
CO 3	Analyze the basics of transaction processing.	K4
CO 4	Apply the various concurrency control techniques.	K3
CO 5	Understand database storage structures and access techniques.	K3

Text Books	1. Abraham Silberschatz (Author), Henry F. Korth (Author), S. Sudarshan (Author), "Database System Concepts", Mc Graw hill, VII edition,2021.
Reference Books	1. M. L. Gillenson, "Fundamentals of Database Management Systems", Wiley Third Edition, 2023. 2. Peter Rob & Carlos Coronel, "Database Systems design, Implementation, and Management", 7th Edition, 2006.

Tools for Assessment -Theory

CIA I	CIA II	CIA III	Assignment / Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Tools for Assessment– Practical

Model Exam I	Model Exam I	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	2	-	-	-	-	3	2	3	1
CO2	2	3	3	1	1	-	-	-	2	1	1	2
CO3	1	3	2	2	1	-	-	-	2	2	1	1
CO4	1	3	3	3	-	-	-	-	1	2	1	2
CO5	3	1	2	1	1	-	-	-	3	2	3	2

3-High;2-Medium;1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. S. Sivakumar - AP/SG Computer Science and Engineering. Name and Department of the Faculty Member	Dr. S. SUBASREE, M Tech. Ph.D Professor and Head, Computer Science and Engineering Nehru Institute of Engineering and Technology Name and Seal of the Chairperson-BoS

Course Code	Title					
U23CS405	INTERNET OF THINGS					
Semester: IV	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	2	0	2	3		
Course pre-requisites	Basic knowledge of Computer Network					

Course Objectives

1	To understand smart objects and IoT architectures.
2	To analyse the functioning of hardware devices and sensors used for IoT
3	To analyse network communication aspects and protocols used in IoT
4	To apply IoT for developing real-life applications using arduino programming.
5	To analyse IoT infrastructure for popular applications.

Course Category	Program Core Course (PCC)
Development Needs	Global

Course Description: To learn about all the components of any Internet of Things and embedded systems for the input of the systems and also data analytics in order to make smart systems

Course Content

Unit	Description	
I	**FUNDAMENTALS OF IoT:** Introduction to IoT – IoT definition – Characteristics – IoT Complete Architectural Stack – IoT enabling Technologies – IoT Challenges. Sensors and Hardware for IoT.	
	Contact Periods	06
II	**HARDWARE FOR IOT:** Sensors, Digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, and participatory sensing technology.	
	Contact Periods	06
III	**NETWORK & COMMUNICATION ASPECTS IN IOT:** Wireless Medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.	
	Contact Periods	06
IV	**PROGRAMMINGTHE ARDUNIO:** Ardunio Platform Boards Anatomy, Ardunio IDE, coding, using emulator, using libraries, programming the ardunio for IoT.	
	Contact Periods	06
V	**CHALLENGES IN IOT DESIGN CHALLENGES:** Development Challenges, Security Challenges, Other challenges IoT Applications: Smart Metering, E-health, City Automation, Automotive Applications, home automation.	
	Contact Periods	06

Total Periods	**30**

LIST OF EXPERIMENTS

The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

1. Start Raspberry Pi and try various Linix commands in command terminal window: ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.
2. Run some python programs on Pi like:

a) Read your name and print Hello message with your name

b) Read two numbers and print their sum, difference, product and division. c) Word and character count of a given string.

d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.

3. Run some python programs on Pi like:

a) Print a name 'n' times, where name and n are read from standard input, using for and while loops.

b) Handle Divided by Zero Exception.

c) Print current time for 10 times with an interval of 10 seconds.

d) Read a file line by line and print the word count of each line.

4. Run some python programs on Pi like:

a) Light an LED through Python program

b) Get input from two switches and switch on corresponding LEDs

c) Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

5. Run some python programs on Pi like:

a) Flash an LED based on cron output (acts as an alarm)

b) Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.

c) Get the status of a bulb at a remote place (on the LAN) through web.

6. Mini Project

Contact Periods	**30**
Total Periods	**60**

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

CO 1	Understand the various concept of the IoT and their technologies.	K2
CO 2	Develop IoT applications using different hardware platforms.	K3
CO 3	Implement the various IoT Protocols.	K4
CO 4	Develop and deploy the IoT application.	K4
CO 5	Design IoT based environment for the Real Time Environment.	K3

Text Books	1. Olivier Hersent, David Boswarthick, Omar Elloumi" The Internet of Things: Key Applications and Protocols", Willey, January 2015. 2. Raj Kamal "Internet of Things", McGraw-Hill, second edition, June 2022.
Reference Books	1. Arshdeep Bahga, Vijay Madisetti "Internet of Things (A hands on approach)" 1ST edition, VPI publications,2014.

	2. Adrian McEwen, Hakin Cassimally "Designing the Internet of Things" Wiley India.

Tools for Assessment-Theory

CIA I	CIA II	CIA III	Assignment / Seminar / Case Study	Attendance	Total
10	10	10	5	5	40

Tools for Assessment – Practical

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	3	-	-	1	-	1	-	3
CO2	3	3	3	3	3	2	1	1	3	3	1	3
CO3	3	3	3	3	3	2	1	1	3	3	1	3
CO4	3	3	3	3	3	2	1	1	3	3	1	3
CO5	3	3	3	3	3	2	1	1	3	3	1	3

3-High;2-Medium;1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	-
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr.S.Sivakumar – AP(SG) Computer Science and Engineering Name and Department of the Faculty Member	Dr. S. SUBASREE, M Tech. Ph.D Professor and Head. Computer Science and Engineering Name and Seal of the Chairperson-BoS Coimbatore TN India

Course Code	Title					
U23CS406	COMPUTER NETWORKS					
Semester: IV	L	T	P	Credits	CIA:50Marks	ESE: 50 Marks
	2	0	2	3		
Course pre-requisites	Basic Knowledge of Communication Systems					

Course Objectives

1	To understand the concepts of layering and socket programming
2	To apply error and flow control mechanism
3	To understand the concepts of layering and socket programming
4	To analyze the various transport layer protocols
5	To analyses services provided by application layer protocols

Course Category	Program Core Course (PCC)
Development Needs	Global

Course Description: To design, implement, and manage computer networks.

Course Content

Unit	Description	
I	**INTRODUCTION TO PHYSICAL LAYER**: Introduction Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite –OSI Model – Introduction to Sockets – Socket Programming - Physical Layer: Data and Signals - Performance – Transmission media- Switching –Circuit Switching	
	Contact Periods'	**06**
II	**DATA LINK LAYER**: Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN - (802.11)	
	Contact Periods	**06**
III	**NETWORK LAYER and ROUTING**: Switching: Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP,RARP, ICMP, DHCP - Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing – OSPF - – Path-vector routing - BGP - Multicast Routing: DVMRP – PIM - Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.	
	Contact Periods	**06**
IV	**TRANSPORT LAYER**: Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DEC bit, RED) – SCTP – Quality of Service.	
	Contact Periods	**06**
V	**APPLICATION LAYER**: Application Layer protocols: HTTP – FTP – Email protocols(SMTP - POP3 - IMAP - MIME) – DNS – SNMP	
	Contact Periods	**06**
	Total Periods	**30**

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. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
8. Study of TCP/UDP performance using Simulation tool.
9. Simulation of Distance Vector/ Link State Routing algorithm.
10. Simulation of an error correction code (like CRC)
11. Mini Project

Contact Periods	**30**
Total Periods	**60**

Course Outcomes

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

CO 1	Understand basic layers and its functions in computer networks.	K2
CO 2	Apply different protocols for data transmission.	K3
CO 3	Analyze various routing algorithms.	K5
CO 4	Analyse flow control and congestion control mechanis,	K4
CO 5	Analyze the working of various application layer protocols.	K4

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

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 Educaion,2013. 3. Nader F. Mir, "Computer and Communication Networks", Second Edition, Prentice Hall, 2014. 4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill, 2012.

Tools for Assessment Theory

CIAI	CIAII	CIAIII	Assignment/Seminar/ Case Study	Attendance	Total
10	10	10	5	5	40

Tools for Assessment – Practical

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	2	-	1	1	1	3	2	3	1
CO2	2	3	3	1	1	1	1	1	2	1	1	2
CO3	1	3	2	2	1	1	-	1	2	2	1	1
CO4	1	3	3	3	-	-	1	-	1	2	1	2
CO5	3	1	2	1	1	1	1	1	3	2	3	2

3-High;2-Medium;1-Low

CO \ PSO	PSO1	PSO2
CO1	1	1
CO2	1	-
CO3	1	1
CO4	-	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr.S.Sivakumar-AP/CSE Computer science and Engineering Name and Department of the Faculty Member	Dr. S. SUBASREE, M.Tech., Ph.D Professor and Head Computer Science and Engineering Name and Seal of the Chairperson-BoS Coimbatore TN India

Course Code	Title					
U23IT417	OPERATING SYSTEMS LABORATORY					
Semester: IV	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		

Course pre-requisites	Basic Knowledge of Operating Systems

Course Objectives

1	To understand the basics and functions of operating systems.
2	To understand the concept of deadlocks.
3	To analyze various memory management schemes.
4	To analyse I/O management and file systems.
5	To implement C programs using Unix system call.

Course Category	Program Core Course (PCC)
Development Needs	Global / National

Course Description: To learn about various functions of Operating Systems.

Course Content

LIST OF EXPERIMENTS

1. Installation of windows operating system
2. Illustrate UNIX commands and Shell Programming
3. Process Management using System Calls: Fork, Exit, Getpid, Wait, Close
4. Write C programs to implement the various CPU Scheduling Algorithms
5. Illustrate the inter process communication strategy
6. Implement mutual exclusion by Semaphore
7. Write C programs to avoid Deadlock using Banker's Algorithm
8. Write a C program to Implement Deadlock Detection Algorithm
9. Write C program to implement Threading
10. Implement the paging Technique using C program
11. Write C programs to implement the following Memory Allocation Methods

a. First Fit b. Worst Fit c. Best Fit

12. Write C programs to implement the various Page Replacement Algorithms
13. Write C programs to Implement the various File Organization Techniques
14. Implement the following File Allocation Strategies using C programs

a. Sequential b. Indexed c. Linked

15. Write C programs for the implementation of various disk scheduling algorithms
16. Install any guest operating system like Linux using VMware.
17. Mini Project

Contact Periods	30

Course Outcomes

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

CO 1	Analyze various scheduling algorithms and process synchronization.	K2
CO 2	Apply deadlock prevention and avoidance algorithms.	K3
CO 3	Analyze various memory management schemes.	K4

CO 4	Apply the functionality of file systems, I/O systems, and Virtualization	K3
CO 5	Analyze iOS and Android Operating Systems	K3

K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculations & Result	Viva-Voce	Total
20	30	40	10	100

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2	-	-	1	-	-	-	1
CO2	3	2	2	-	2	-	-	1	-	-	-	1
CO3	3	2	2	-	2	-	-	1	-	-	-	1
CO4	3	2	2	-	2	-	-	1	-	-	-	1
CO5	3	2	2	-	2	-	-	1	-	-	-	1

3-High;2-Medium;1-Low

CO \ PSO	PSO1	PSO2
CO1	-	1
CO2	-	1
CO3	-	1
CO4	-	1
CO5	-	1

Course designed by	Verified by
N. Rat Signature of the Faculty Member	K. Sivakumar Signature of the Chairperson-BoS
Dr. N. RATHINA KUMAR AP(SG) / IT Name and Department of the Faculty Member	Dr. K. SIVAKUMAR, M.E.,Ph.D., Associate Professor & HOD I/c., Department of Information Technology, Nehru Institute of Engineering & Technology, Thirumalayampalayam, Coimbatore-641105. Name and Seal of the Chairperson-BoS