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 ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM

B.E. - ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATION - 2023

DEPARTMENT OF ELECTRONICS AND COMMUNICATION 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 become a centre of excellence in electronics and communication engineering by imparting quality technical education imbibed with human Values and professional ethics, facilitating research activities and cater to the growing industrial demands and societal needs.

MISSION

- To educate and empower the students with state of art knowledge and latest trends in electronics and communication engineering to meet the growing real world challenges
- To inculcate professional ethics and moral values among the students.
- To impart industrial and managerial skills to promote self-employment and adapt to appropriate technology to meet the challenges arising out of global demand.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

A Graduate of the Electronics and Communication Engineering Program will be able to

- **PEO1:** Establish a strong foundation in the fundamentals of mathematics, science and engineering necessary to formulate, analyze and solve engineering problems and prepare themselves for post graduate studies and/or for a successful carrier.

- **PEO2:** Define and analyze real life engineering problems in the field of electronics and communication engineering and find sound, feasible and acceptable solutions beneficial to the society.

- **PEO3:** Work effectively in a group with good communication skill, managerial skill, professionalism and ethical attitude, possessing expertise to write reports and express clearly in a multidisciplinary environment through continuous learning.

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

A Graduate of the Electronics and Communication Engineering Program will be able to

- **PSO1:** Apply the fundamental knowledge of mathematics, engineering science to identify, formulate, research and solve electronics and communication engineering problems in the areas of antenna design, embedded systems, image processing, VLSI design and communication systems.

- **PSO2:** Design analog and digital electronic circuits by using modern engineering and computing tools and develop a system component to meet specific needs by considering public health, safety, societal and environmental issues.

- **PSO3:** Apply ethical issues, social environmental impact and managerial skills to serve the society and communicate the engineering activities effectively to engineering community.

SCHEME OF EXAMINATION
B.E.-ELECTRONICS AND COMMUNICATION 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	U23PY203	Physics for Electronics Engineering	BSC	3	40	60	100	3
II	U23GE204	Engineering Graphics	ESC	6	40	60	100	4
II	U23EC205	Circuit Analysis	PCC	4	40	60	100	4
II	U23GE206	Tamils and Technology	HSMC	1	40	60	100	1
PRACTICAL								
II	U23EC217	Circuit Analysis Laboratory	PCC	2	60	40	100	1
II	U23GE218	Engineering Practice 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	**30**	**-**	**-**	**-**	**23**

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
III	U23LP301	Linear Algebra and Probability	BSC	4	40	60	100	4
III	U23EC302	Data Structures and Algorithms using C	ESC	3	40	60	100	3
III	U23EC303	Signals and Systems	PCC	4	40	60	100	4
III		Mandatory Course – I	MC	3	100	-	100	0
THEORY WITH INTEGRATED LAB								
III	U23EC304	Electronic Circuits	PCC	5	50	50	100	4
III	U23EC305	Digital Systems Design	PCC	5	50	50	100	4
PRACTICAL								
III	U23EC316	Data Structures & Algorithms using C Laboratory	ESC	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 Sciences and Sustainability	BSC	2	40	60	100	2
IV	U23RS402	Random Processes and Statistics	BSC	4	40	60	100	4
IV	U23EC403	Electromagnetic Fields	PCC	3	40	60	100	3
IV	U23EC404	Linear Integrated Circuits	PCC	3	40	60	100	3
IV	U23EC405	Control Systems Engineering	PCC	3	40	60	100	3
IV		Mandatory Course – II	MC	3	100	-	100	0
THEORY WITH INTEGRATED LAB								
IV	U23EC406	Analog and Digital Communication	PCC	5	50	50	100	4
PRACTICAL								
IV	U23EC417	Linear Integrated Circuits 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	**29**	**-**	**-**	**-**	**22**

CURRICULUM
AND
SYLLABUS

B.E - ELECTRONICS AND COMMUNICATION 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 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	PSO3
CO1	-	-	2
CO2	-	-	2
CO3	-	-	2
CO4	-	-	2
CO5	-	-	2

Course designed by	Verified by
R. Thg Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Deepa 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					
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	PSO3
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. A. Sangeetha Devi 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					
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, CO2 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	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	1	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. P. PERIASAMY Dept. of Science and 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	PSO3
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. Lakshmipriya 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					
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	PSO3
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
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

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	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	1	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					
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	PSO3
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
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

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	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	1	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
A-Lakshmi Priya 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					
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	PSO3
CO1	-	1	2
CO2	-	1	2
CO3	-	1	2
CO4	-	1	2
CO5	-	1	2

Course designed by	Verified by
R. Thg Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Deepa. 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

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	U23PY203	Physics for Electronics Engineering	BSC	3	0	0	3	3
4	U23GE204	Engineering Graphics	ESC	2	0	4	6	4
5	U23EC205	Circuit Analysis	PCC	3	1	0	4	4
6	U23GE206	Tamils and Technology	HSMC	1	0	0	1	1
PRACTICAL								
7	U23EC217	Circuit Analysis Laboratory	PCC	0	0	2	2	1
8	U23GE218	Engineering Practice 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	**14**	**2**	**14**	**30**	**23**

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

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 (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	PSO3
CO1	-	-	2
CO2	-	-	2
CO3	-	-	2
CO4	-	-	2
CO5	-	-	2

Course designed by	Verified by
R.Hrs.	P. T. Hemal
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Deepa. Department of Science & Humanities	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					
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	PSO3
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. A. Sangeetha Devi 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					
U23PY203	PHYSICS FOR ELECTRONICS ENGINEERING					
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 to understand the basics of crystallography and its importance in studying materials properties.
2	To instil knowledge on physics of semiconductors and diodes, determination of charge carriers and device applications.
3	To analyse the biasing in BJT semiconductor to study the operation as voltage divider and a switch.
4	To establish the biasing in FET semiconductor devices to study the flow of current and stability of operation.
5	To make the students to understand the knowledge on VI characteristics of semiconductor device and specific applications.

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 form the basis for electronic systems and devices.

Course Content

Unit	Description	
I	**CRYSTALLOGRAPHY:** Fundamental of Crystal structures - Structure and packing fractions of SC, BCC, FCC, and HCP structures - Crystal planes, directions, and Miller indices - Distance between successive planes (d-planar distance) crystalline and noncrystalline materials - Crystal growth technique- Czochralski technique-Bridgman technique.	
	Contact Periods	**09**
II	**SEMICONDUCTORS AND TRANSPORT DEVICES:** Fundamental of Semiconductors - Carrier concentration in intrinsic semiconductors - Extrinsic semiconductors - Carrier concentration in N-type & P type semiconductors - Variation of carrier concentration with temperature - PN junction diode - Zener diode.	
	Contact Periods	**09**
III	**BIPOLAR JUNCTION TRANSISTOR:** Construction and operation of NPN Transistor, Input and Output characteristics of CE, CB, and CC configurations, h parameter model for CE, CB, and CC configurations - Need for biasing - Biasing methods for BJT: Fixed bias - Collector to base bias - Voltage divider bias - BJT as a switch.	
	Contact Periods	**09**
IV	**FIELD EFFECT TRANSISTORS:** Junction Field Effect Transistor: construction, operation, Drain and Transfer characteristics - MOSFET: Enhancement MOSFET, Depletion MOSFET, Drain and Transfer characteristics, Biasing of FET.	
	Contact Periods	**09**
V	**SPECIAL SEMICONDUCTOR DEVICES:** Construction, operation, and V-I characteristics: LED - Organic LED - SCR – DIAC - TRIAC - Photo diode -Laser diode -Photo Transistor.	
	Contact Periods	**09**

	Total Periods	**45**
Course Outcomes **Upon successful completion of the course, students will be able to:**		
CO 1	Understand the basics of crystals, their structures and different crystal growth techniques.	K2
CO 2	Map the operation of semiconductor devices with generalized switch and voltage rectifier	K3
CO 3	Analyze the biasing in BJT semiconductor to study the operation as voltage divider and as a switch.	K4
CO 4	Analyze the biasing in FET semiconductor devices to study the flow of current and stability of operation.	K4
CO 5	Appreciate the importance of VI characteristics of semiconductor device and specific applications.	K2
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6:Creating		
Text Books	1. Kasap S.O, - Principles of Electronic Materials and Devices, McGraw-Hill Education, 3rd Edition, 2007. 2. Umesh K Mishra and Jasprit Singh, - Semiconductor Device Physics and Design, Springer, 2nd Edition, 2008. 3. Pillai S.O, - Solid State Physics, New age International Publishers, 7th Edition, 2015.	
Reference Books	1. Jacob Millman, Christos C, Halkias and Satyabrata Jit, "Electronic Devices and Circuits", 2nd Edition, Tata McGraw-Hill, 2010. 2. Salivahanan S, - Electronic Devices, Tata McGraw- Hill, 2nd Edition, 2018. 3. Donald A Neaman, - Semiconductor Physics and Devices‖, Tata Mc GrawHill Inc., 3rd Edition, 2007. 4. Robert Boylestad and Louis Nashelsky, - Electron Devices and Circuit Theory, Pearson Prentice Hall, 10th Edition, July 2008.	

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	2	1	2	-	2	-	-	-	-	-	-
CO3	3	2	2	-	2	-	-	-	-	-	-	1
CO4	3	-	1	-	3	2	3	-	-	-	-	1
CO5	3	-	2	1	-	2	-	-	-	-	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. P. PERIASAMY Dept. of Science and 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					
U23GE204	ENGINEERING GRAPHICS					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	2	0	4	4		
Course pre-requisites	Geometry, Basic Mathematics					

Course Objectives

1	To draw engineering curves.
2	To project points, lines and plane surface.
3	To sketch the simple objects in freehand and orthographic projection of solids and section of solids.
4	To represent the development of solids.
5	To draw isometric and perspective projections of simple solids.

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

Course Description: Using a combination of lines, symbols, and signs, engineering graphics and design blends cognitive and manipulative skills to communicate graphically and create systems, processes, goods, and services that improve quality of life and promote economic progress.

Course Content

Unit	Description
I	**CONCEPTS AND CONVENTIONS (Not for Examination):** Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning. **PLANE CURVES:** Basic Geometrical constructions, Curves used in engineering practices: Conics - Construction of ellipse, parabola and hyperbola by eccentricity method - Construction of cycloid - construction of involutes of square and circle - Drawing of tangents and normal to the above curves.
	Contact Periods | **05+10**
II	**PROJECTION OF POINTS, LINES AND PLANE SURFACE:** Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method
	Contact Periods | **05+10**
III	**PROJECTION OF SOLIDS AND FREEHAND SKETCHING:** Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles - Representation of Three Dimensional objects - Layout of views- Freehand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)
	Contact Periods | **05+10**

IV	**PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES:** Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other - obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids - Prisms, pyramids cylinders and cones. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)
	Contact Periods **05+10**
V	**ISOMETRIC AND PERSPECTIVE PROJECTIONS:** Principles of isometric projection - isometric scale - isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)
	Contact Periods **05+10**
	Total Periods **75**

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

CO 1	Use BIS conventions and specifications for engineering drawing.	K1
CO 2	Construct the conic curves, involutes and cycloid.	K3
CO 3	Solve practical problems involving projection of lines.	K3
CO 4	Draw the orthographic, isometric and perspective projections of simple solids.	K2
CO 5	Draw the development of simple solids.	K2

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

Text Books

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 54th Edition, 2023.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015.

Reference Books

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore,27th Edition, 2017.
3. Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2012.
4. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
5. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 11th Edition, 2011.

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	2	-	2	-	-	-	-	3	-	2
CO2	3	1	2	-	2	-	-	-	-	3	-	2
CO3	3	1	2	-	2	-	-	-	-	3	-	2
CO4	3	1	2	-	2	-	-	-	-	3	-	2
CO5	3	1	2	-	2	-	-	-	-	3	-	2

3-High; 2-Medium; 1-Low

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

Special points applicable to End Semester Examinations on Engineering Graphics:

1. There will be five either or type questions, each of covering all the units in the syllabus.
2. Each question will carry 20 marks, making a total of 100.
3. The given answer paper will be A3 size.
4. The students should use appropriate scale to fit the answers.
5. The examination will be conducted in FN/AN sessions on the same day.

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

Course Code	Title					
U23EC205	CIRCUIT ANALYSIS					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	NIL					

Course Objectives	
1	To learn the basic concepts and behaviour of DC circuits.
2	To understand various methods of circuit/network analysis using network theorems.
3	To understand the sinusoidal and steady state analysis of the circuits subjected to DC excitations and AC with sinusoidal excitations.
4	To understand the transient and resonance in RLC circuits.
5	To learn the concept of coupling in circuits and topologies.

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

Course Description: The course helps the students in understanding and analyzing Electrical quantities used in Electrical and Electronics Engineering.

Course Content

Unit	Description	
I	**DC CIRCUIT ANALYSIS:** Basic Components of electric Circuits, Charge, current, Voltage and Power, Voltage and Current Sources, Ohms Law, Kirchhoff's Current Law, Kirchhoff's voltage law, The single Node – Pair Circuit, series and Parallel Connected Independent Sources, Resistors in Series and Parallel, voltage and current division, Nodal analysis, Mesh analysis.	
	Contact Periods	**12**
II	**NETWORK THEOREMS:** Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion.	
	Contact Periods	**12**
III	**SINUSOIDAL STEADY STATE ANALYSIS:** Sinusoidal Steady – State analysis , Characteristics of Sinusoids, Complex Forcing Function, The Phasor, Phasor relationship for R, L, and C, impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams, AC Circuit Power Analysis, Instantaneous Power, Average Power, apparent Power and Power Factor, Complex Power.	
	Contact Periods	**12**
IV	**TRANSIENTS AND RESONANCE IN RLC CIRCUITS:** Basic RL and RC Circuits, Source- Free RL Circuit, Source-Free RC Circuit, Unit-Step Function, Driven RL Circuits, Driven RC Circuits, RLC Circuits, Frequency Response, Parallel Resonance, Series Resonance, Quality Factor.	
	Contact Periods	**12**

V	**COUPLED CIRCUITS AND TOPOLOGY:** Magnetically Coupled Circuits, Mutual Inductance, Linear Transformer, Ideal Transformer, Introduction to Network Topology, Trees and General Nodal analysis, Links and Loop analysis.
	Contact Periods 12
	Total Periods 60

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

CO 1	Understand the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC circuits.	K2
CO 2	Apply suitable network theorems and analyze AC and DC circuits.	K3
CO 3	Analyze steady state response of any R, L and C circuits.	K4
CO 4	Analyze the transient response for any RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.	K4
CO 5	Analyze the coupled circuits and network topologies.	K4

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

Text Books	1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis", McGraw Hill education, 9th Edition, 2018. 2. Charles K. Alexander & Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", McGraw- Hill, 2nd Edition, 2003. 3. Joseph Edminister and Mahmood Nahvi, —Electric Circuits, Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.
Reference Books	1. Robert.L. Boylestead, "Introductory Circuit Analysis", Pearson Education India, 12th Edition, 2014. David Bell, "Fundamentals of Electric Circuits", Oxford University press, 7th Edition, 2009. 2. John O Mallay, Schaum's Outlines "Basic Circuit Analysis", The McGraw Hill companies, 2nd Edition, 2011. 3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 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	-	-	-	-	-	-	-	-
CO2	3	2	2	1	-	-	-	-	-	-	-	-
CO3	3	2	2	1	-	-	-	-	-	-	-	-
CO4	3	2	2	1	-	-	-	-	-	-	-	-
CO5	3	2	2	1	-	-	-	-	-	-	-	-

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	2	1	-
CO2	2	1	-
CO3	2	1	-
CO4	2	1	-
CO5	2	1	-

Course designed by	Verified by
D.Nagiz Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. D. NAGESWARI Electronics & Communication Engg Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr. V. JAYARAJ
Professor & Head
Department of ECE
Nehru Inst. of Engg. & Technology
T.M. Palayam, Coimbatore - 641 105

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	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	1	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					
U23EC217	CIRCUIT ANALYSIS LABORATORY					
Semester: II	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	Engineering Mathematics & Engineering Physics					

Course Objectives

1	To gain hands-on experience in Thevenin theorem, Norton theorem, KVL and KCL theorem.
2	To gain hands-on experience in Superposition theorem and Maximum power transfer theorems.
3	To understand the working of RL, RC and RLC circuits.
4	To understand the transient analysis of RL and RC circuits.
5	To perform the simulation of network theorems and analysis of RL and RC circuits.

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

Course Description: The course helps the students in understanding and analyzing Electrical quantities used in Electrical and Electronics Engineering.

Course Content

LIST OF EXPERIMENTS

1. Verifications of KVL & KCL.
2. Verifications of Thevenin & Norton theorem.
3. Verification of Superposition Theorem.
4. Verification of maximum power transfer Theorem.
5. Determination of Resonance Frequency of Series & Parallel RLC Circuits.
6. Transient analysis of RL and RC circuits.
7. PSPICE Simulation Experiments:
   a) KVL & KCL
   b) Thevenin, Norton, Superposition, Maximum power transfer theorem
   c) Series & Parallel RLC Circuits
   d) RL and RC circuits

Total Periods	**30**

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

CO 1	To verify Thevenin theorem, Norton theorem, KVL KCL theorem.	K2
CO 2	To verify Superposition theorem and Maximum power transfer theorems.	K2
CO 3	To design RL, RC and RLC circuits	K4
CO 4	To understand the transient analysis of RL and RC circuits.	K2
CO 5	To analyze the simulation of network theorems.	K4

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	3	1	-	2	-	-	1	-	-	-	-
CO2	3	3	1	-	2	-	-	1	-	-	-	-
CO3	3	3	1	-	2	-	-	1	-	-	-	-
CO4	3	3	1	-	2	-	-	1	-	-	-	-
CO5	3	3	1	-	2	-	-	1	-	-	-	-

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1

Course designed by	Verified by
S.M.Deepa Signature of the Faculty Member	V. Jayaraj Signature of the Chairperson-BoS
Mrs. S.M.Deepa, Electronics & communication Engg. Name and Department of the Faculty Member	Dr. V. JAYARAJ Professor & Head Department of ECE Nehru Inst. of Engg. & Technology T.M. Palayam, 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	U23LP301	Linear Algebra and Probability	BSC	3	1	0	4	4
2	U23EC302	Data Structures and Algorithms using C	ESC	3	0	0	3	3
3	U23EC303	Signals and Systems	PCC	3	1	0	4	4
4		Mandatory Course - I	MC	3	0	0	3	0
THEORY WITH INTEGRATED LAB								
5	U23EC304	Electronic Circuits	PCC	3	0	2	5	4
6	U23EC305	Digital Systems Design	PCC	3	0	2	5	4
PRACTICAL								
7	U23EC316	Data Structures & Algorithms using C Laboratory	ESC	0	0	2	2	1
ENHANCEMENT COURSES								
8		Skill Enhancement Course – II	SEC	0	0	2	2	1
9		Ability Enhancement Course -II	AEC	0	0	2	2	1
TOTAL				**18**	**2**	**10**	**30**	**22**

Course Code	Title					
U23LP301	LINEAR ALGEBRA AND PROBABILITY					
Semester: III	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 Numerical Methods and Complex Functions					

Course Objectives	
1	To introduce the basis and dimension of vector space.
2	To develop the matrix of linear transformation and its eigenvalues and eigenvectors.
3	To develop an understanding for the study of Matrix decomposition.
4	To provide necessary basic concepts of probability and random variables and to introduce some standard distributions applicable to engineering.
5	To develop the techniques of distribution to solve problems in continuous random variables.

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 linear algebra and probability. Students will be able to solve problems related to engineering applications by using these techniques.

Course Content

Unit	Description	
I	**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**
II	**INNER PRODUCTS:** Eigenvalues, Eigenvectors, Diagonalization of matrices, Inner products, orthogonal matrices, orthogonal and orthonormal bases, Gram-Schmidt process.	
	Contact Periods	**12**
III	**MATRIX DECOMPOSITION**: Eigenvalues using QR transformations – QR factorization – LU decomposition – Canonical forms – singular value decomposition and applications – least square approximations.	
	Contact Periods	**12**
IV	**PROBABILITY AND DISCRETE RANDOM VARIABLES**: Probability – Axioms of probability – Conditional probability – Baye's theorem. Random Variables – Discrete random variables – Probability Mass functions – Mean and Variance, Binomial distribution – Poisson distribution – Geometric distribution.	
	Contact Periods	**12**
V	**CONTINUOUS RANDOM VARIABLES**: Continuous random variables – Probability density functions – Mean and Variance, Uniform distribution – Exponential distribution – Normal distribution.	
	Contact Periods	**12**
	Total Periods	**60**

Course Outcomes Upon successful completion of the course, students will be able to:		
CO 1	Remember the basic concepts of linear independence, basis of vector space.	K1
CO 2	Apply the knowledge of inner products, orthogonal projections and various computational and theoretical purpose in linear algebra.	K3
CO 3	Understand the techniques to solve Matrix decomposition.	K2
CO 4	Understand the techniques of distribution to solve problems in probability and discrete random variables.	K2
CO 5	Understand the techniques of distribution to solve problems in continuous random variables.	K2
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		

Text Books	1. Friedberg. A.H., Insel. A.J. and Spence. L., Linear Algebra, Prentice Hall of India, New Delhi, 4th Edition, 2004. 2. Gilbert Strang, Linear Algebra, 5th Edition, ANE Books, 2016. 3. Johnson. R.A., Miller. I and Freund. J., "Miller and Freunds Probability and Statistics for Engineers", Pearson Education, Asia, 9th Edition, 2016. 4. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
Reference Books	1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences, Cengage Learning, New Delhi, 8th Edition, 2014. 2. Ross. S.M., "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Elsevier, 2014. 3. Spiegel. M.R., Schiller. J. and Srinivasan . R.A., "Schaums Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 4th Edition, 2012. 4. Kumaresan. S., Linear Algebra – A Geometric Approach, Prentice – Hall of India, New Delhi, Reprint, 2010. 5. Lay, D.C., Linear Algebra and its Applications‖, 5th Edition, Pearson Education, 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	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**	**PSO3**
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. A. Sangeetha Devi 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, Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EC302	DATA STRUCTURES AND ALGORITHMS USING C					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	NIL					

Course Objectives	
1	To understand the concepts of ADTs and linear data structures List.
2	To know the concepts of linear data structure stack and Queue.
3	To know the concepts of sorting, searching and hashing techniques.
4	To understand the concepts of non-linear data structure Trees.
5	To understand the concepts of non-linear data structure Graphs.

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

Course Description: This course is designed to provide a comprehensive understanding of the fundamentals of data structures and algorithms.

Course Content

Unit	Description	
I	**LINEAR DATA STRUCTURES – LIST:** Abstract Data Types (ADTs) – List ADT – Array Based Implementation – Linked List Based Implementation – Singly Linked Lists, Doubly Linked Lists – Circular Linked List.	
		Contact Periods 09
II	**LINEAR DATA STRUCTURES – STACK AND QUEUE:** Stack ADT – Implementation of Stack, Applications: Conversion of Infix to Postfix expression, Queue ADT – Queue Implementation – Priority Queues –Applications: Printer Spooling.	
		Contact Periods 09
III	**SORTING, SEARCHING AND HASHING TECHNIQUES** Introduction to sorting, Types: Insertion Sort – Quick Sort – Heap Sort – Merge Sort , Searching: Linear and Binary Search, Hashing – Hash Functions – Separate Chaining – Open Addressing – Double Hashing – Rehashing.	
		Contact Periods 09
IV	**NON LINEAR DATA STRUCTURES –TREES:** Tree ADT– Tree Traversals – Binary Tree ADT– Expression Trees- Implementation of expression tree –Applications of Trees – Binary search Tree ADT – Operation in binary search tree – Introduction to Heap – Properties.	
		Contact Periods 09
V	**NON LINEAR DATA STRUCTURES –GRAPHS:** Introduction to Graph – Types of graph – Graph traversal – Breadth-first traversal – Depth- first traversal –Topological Sort – Shortest-Path Algorithms – Dijkstra's Algorithm – Minimum Spanning Tree Algorithm.	
		Contact Periods 09

Total Periods	**45**

Course Outcomes:

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

CO 1	Understand the concept of linear data structures.	K2
CO 2	Demonstrate stack and Queue with suitable applications.	K2
CO 3	Implement various searching, sorting and hashing techniques.	K3
CO 4	Analyze non-linear data structures trees.	K4
CO 5	Implement various problems in graph data structures.	K3

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

Text Books	1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 1997. 2. Reema Thareja, "Programming in C", Second Edition, Oxford University Press, 2018.
Reference Books	1. Brian W. Kernighan, Rob Pike, "The Practice of Programming", Pearson Education, 1999. 2. Paul J. Deitel, Harvey Deitel, "C How to Program", Seventh Edition, Pearson Education, 2013. 3. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education,1983. 4. Ellis Horowitz, Sartaj Sahni and Susan Anderson, "Fundamentals of Data Structures", Galgotia, 2008.

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	3	-	2	-	-	-	-	-	1	1
CO2	3	2	3	-	2	-	-	-	-	-	1	1
CO3	3	2	3	-	2	-	-	-	-	-	1	1
CO4	3	2	3	-	2	-	-	-	-	-	1	1
CO5	3	2	3	-	2	-	-	-	-	-	1	1

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	1	-	-
CO2	1	-	-
CO3	1	-	-
CO4	1	-	-
CO5	1	-	-

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. D. NAGESWARI, Mrs. N. Revathi Electronics & Communication Engg. Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr. V. JAYARAJ
Professor & Head
Department of ECE
Nehru Inst. of Engg. & Technology
T.M. Palayam, Coimbatore - 641 105

Course Code	Title					
U23EC303	SIGNALS AND SYSTEMS					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	NIL					

Course Objectives	
1	To understand the basic properties of signal and systems.
2	To know the methods of characterization of LTI systems in time domain.
3	To analyze continuous time signals and system in the Fourier and Laplace domain.
4	To analyze discrete time signals and system in the Fourier and Z transform domain.
5	To analyze linear time invariant discrete time systems.

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

Course Description: This course is designed to develop the understanding of the basic ideas of the Signals & Systems encountered in engineering. The main focus will be on the methods for characterizing and analyzing continuous-time and discrete time signals and systems.

Course Content

Unit	Description	
I	**CLASSIFICATION OF SIGNALS AND SYSTEMS:** Standard signals- Step, Ramp, Pulse, Impulse, Real and complex exponentials and Sinusoids. Classification of signals – Continuous time (CT) and Discrete Time (DT) signals, Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals -Classification of systems- CT systems and DT systems – Linear & Nonlinear, Time-variant & Time-invariant, Causal & Non-causal, Stable & Unstable.	
	Contact Periods	**12**
II	**ANALYSIS OF CONTINUOUS TIME SIGNALS:** Fourier series for periodic signals - Fourier Transform – properties- Laplace Transforms and Properties.	
	Contact Periods	**12**
III	**LINEAR TIME INVARIANT CONTINUOUS TIME SYSTEMS:** Impulse response - convolution integrals- Differential Equation– Fourier and Laplace transforms in Analysis of CT systems - Systems connected in series / parallel.	
	Contact Periods	**12**
IV	**ANALYSIS OF DISCRETE TIME SIGNALS:** Baseband signal Sampling–Fourier Transform of discrete time signals (DTFT)– Properties of DTFT - Z Transform & Properties.	
	Contact Periods	**12**

V	**LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS:** Impulse response – Difference equations – Convolution sum – Discrete Fourier Transform and Z Transform – Analysis of Recursive & Non-Recursive systems – DT systems connected in series and parallel.
Contact Periods	**12**
Total Periods	**60**

Course Outcomes:

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

CO 1	Determine if a given system is linear/causal/stable.	K2
CO 2	Determine the frequency components present in a deterministic signal.	K2
CO 3	Characterize continuous LTI systems in the time domain and frequency domain.	K3
CO 4	Characterize discrete LTI systems in the time domain and frequency domain.	K3
CO 5	Compute the output of an LTI system in the time and frequency domains.	K3

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

Text Books	1. Oppenheim, Willsky and Hamid, "Signals and Systems", 2nd Edition, Pearson Education, New Delhi, 2015. 2. Simon Haykin, Barry Van Veen, "Signals and Systems", 2nd Edition, Wiley, 2002
Reference Books	1. B. P. Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford, 2009. 2. M. J. Roberts, "Signals and Systems Analysis using Transform methods and MATLAB", McGraw- Hill Education, 2018. 3. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.

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	-	-	-	-	-	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	3	1	1
CO2	3	1	1
CO3	3	1	1
CO4	3	1	1
CO5	3	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
S. MOHAN Electronics and Communication Engg. Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr. V. JAYARAJ
Professor & Head
Department of ECE
Nehru Inst. of Engg. & Technology
T.M. Palayam, Coimbatore - 641 105

Course Code	Title					
U23EC304	ELECTRONIC CIRCUITS					
Semester: III	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	3	0	2	4		
Course pre-requisites	NIL					

Course Objectives	
1	To understand the operation of basic semiconductor devices.
2	To analyze the different types of transistor amplifiers.
3	To design and analyze the feedback amplifiers.
4	To understand the operation of power amplifiers.
5	To design and analyze the oscillators and Multivibrator circuits.

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

Course Description: This course involves a comprehensive understanding and designing of electronics components, analyzing their behaviour and integrating them into circuits.

Course Content

Unit	Description	
I	**SEMICONDUCTOR DEVICES:** PN junction diode, Zener diode, BJT, MOSFET, UJT and SCR – Structure, Operation and V-I characteristics – Zener diode as Voltage regulator.	
	Contact Periods	**09**
II	**TRANSISTOR AMPLIFIERS:** Load line, operating point, biasing methods: Voltage divider bias, BJT small signal model – Analysis of CE, CC amplifiers- Gain and frequency response – MOSFET small signal model– Analysis of CS, Source follower, Differential amplifier.	
	Contact Periods	**09**
III	**FEEDBACK AMPLIFIERS:** General Feedback Structure – Properties of negative feedback – Basic Feedback Topologies – Feedback amplifiers: Voltage Series, Voltage Shunt, Current Series, Current Shunt– Stability analysis of feedback amplifier – Frequency Compensation.	
	Contact Periods	**09**
IV	**POWER AMPLIFIER:** Class A power amplifier, Class B power amplifier – Push pull amplifiers, Complementary Symmetry configuration, Class AB power amplifier and Class C amplifiers- Distortions in power amplifier.	
	Contact Periods	**09**
V	**OSCILLATORS AND MULTIVIBRATOR:** Classification, Barkhausen Criterion - Mechanism for start of oscillation and stabilization of amplitude, Types of Oscillators: Hartley, Colpitts, Phase shift, Wien bridge – Multivibrator: Astable and Monostablemultivibrator.	
	Contact Periods	**09**

Total Periods	**45**

LIST OF EXPERIMENTS

1. Characteristics of PN and Zener diodes.
2. Half wave and Full wave rectifier.
3. Input Output Characteristics of BJT – Common Emitter configuration.
4. Input Output Characteristics of MOSFET.
5. Frequency response of CE - BJT amplifiers.
6. Frequency response of CS amplifiers.
7. CMRR measurement of Differential amplifier.
8. ClassA Transformer Coupled Power amplifier.
9. Design and Simulation of RC Phase Shift Oscillator, Colpitts Oscillator and Hartley Oscillator
10. Design and Simulation of Astable Multivibrator and Monostable Multivibrator.

Total Periods	**30**

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

CO 1	Understand the operation of basic semiconductor devices.	K2
CO 2	Analyze the different types of transistor amplifiers.	K4
CO 3	Design and analyze the feedback amplifiers.	K4
CO 4	Describe the operation of power amplifiers.	K2
CO 5	Design and analyze the oscillators and Multivibrator circuits.	K4

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

Text Books	1. David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education press,5th Edition, 2010. 2. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 11th Edition, Pearson Education / PHI, 2017. 3. Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", Oxford University Press, 7th Edition, 2014.
Reference Books	1. MillmanJ ,Halkias C and Parikh C "Integrated Electronics", Mc Graw Hill, 2017. 2. Donald Schilling and Charles BeloveElectronic Circuits, 3rd Edition, Mc-Graw Hill, 2002. 3. L. Umanand, Power Electronics, Essentials and Applications, John Wiley India Pvt. Ltd, 2009. 4. Dr. P. S. Bimbhra, —Power Electronics‖, Khanna Publishers, Delhi, 2012. 5. https://www.ti.com/product/INA185-Q1 6. https://toshiba.semicon-storage.com/ap-en/top.html

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	3	1	2	-	-	-	2	-	-	1
CO2	3	3	3	1	2	-	-	-	2	-	-	1
CO3	3	3	3	1	2	-	-	-	2	-	-	1
CO4	3	3	3	1	2	-	-	-	2	-	-	1
CO5	3	3	3	1	2	-	-	-	2	-	-	1

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Mrs.K. Sirakami & Mrs.N. Revathi Electronics & Communication Engg Name and Department of the Faculty Member	Dr. V. JAYARAJ Professor & Head Dept. of ECE Nehru Inst. of Engg. & Technology T.M. Palayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EC305	DIGITAL SYSTEMS DESIGN					
Semester: III	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	3	0	2	4		
Course pre-requisites	NIL					

Course Objectives	
1	To present the fundamentals of digital circuits and simplification methods.
2	To practice the design of various combinational digital circuits using logic gates.
3	To bring out the analysis and design procedures for synchronous Sequential circuits.
4	To bring out the analysis and design procedures for asynchronous Sequential circuits.
5	To introduce semiconductor memories and Programmable Logic Devices.

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

Course Description: This course aims in designing combinational and sequential building blocks, using these building blocks to design bigger digital systems.

Course Content

Unit	Description	
I	**MINIMIZATION TECHNIQUES AND LOGIC GATES:** Binary number, Review of Boolean algebra- theorems, sum of product and product of sum simplification, canonical forms minterm and maxterm, Simplification of Boolean expressions using Karnaugh map with and without don't care conditions. Implementation of Boolean expressions using logic gates.	
	Contact Periods	**09**
II	**COMBINATIONAL LOGIC CIRCUITS:** Code Converters: Binary to Greycode, Binary to BCD – Half and Full Adders, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Magnitude Comparator, Encoder Decoder, Priority Encoder, Multiplexer, Demultiplexer.	
	Contact Periods	**09**
III	**SYNCHRONOUS SEQUENTIAL CIRCUITS:** Latches, Flip flops – SR, JK, T, D, Master/Slave FF, Triggering of FF – Moore/Mealy models, state minimization, state assignment, circuit implementation – Counters: Ripple Counters, Ring Counters – Shift registers, Universal Shift Register.	
	Contact Periods	**09**
IV	**ASYNCHRONOUS SEQUENTIAL CIRCUITS:** Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Fundamental and Pulse mode sequential circuits, Design of Hazard free circuits.	
	Contact Periods	**09**
V	**MEMORY AND PROGRAMMABLE LOGIC DEVICES:** Basic memory, static ROM, PROM, EPROM, EEPROM and EAPROM. Implementation of combinational logic/sequential logic design using PROM, PLA and PAL.	

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

LIST OF EXPERIMENTS

1. Design of Adders, Subtractors and Code converters.
2. Design of Multiplexers and Demultiplexers.
3. Design of Encoders and Decoders.
4. Design of Magnitude Comparators.
5. Design and Simulation of Counters.
6. Design and Simulation of Shift registers.
7. Design and Simulation of State machines.

Total Periods	**30**

Course Outcomes:

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

CO 1	Use Boolean algebra and simplification procedures relevant to digital logic.	K2
CO 2	Design various combinational digital circuits using logic gates.	K3
CO 3	Analyze and design synchronous sequential circuits.	K3
CO 4	Analyze and design asynchronous sequential circuits.	K3
CO 5	Build logic gates and use programmable devices.	K3

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

Text Books	1. M. Morris Mano and Michael D. Ciletti, ‘Digital Design’, Pearson, 5th Edition, 2013.
Reference Books	1. Charles H. Roth, Jr, ‘Fundamentals of Logic Design’, Jaico Books, 4th Edition, 2002. 2. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice-Hall of India, 1980. 3. Floyd T.L., "Digital Fundamentals", Charles E. Merril publishing company,1982. 4. John. F. Wakerly, "Digital Design Principles and Practices", Pearson Education, 4 th Edition,2007.

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	3	1	1	-	-	-	-	-	-	1
CO2	3	3	3	1	1	-	-	-	-	-	-	1
CO3	3	3	3	1	1	-	-	-	-	-	-	1
CO4	3	3	3	1	1	-	-	-	-	-	-	1
CO5	3	3	3	1	1	-	-	-	-	-	-	1

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. M.A. Raja & Mr. T. Prabu Electronics & Communication Engg. Name and Department of the Faculty Member	Dr. V. JAYARAJ Professor & Head Department of ECE Nehru Inst. of Engg. & Technology I.M. Palayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EC316	DATA STRUCTURES AND ALGORITHMS USING C LABORATORY					
Semester: III	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	NIL					

Course Objectives	
1	To implement linear and non-linear data structures.
2	To develop applications in C.
3	To use the appropriate linear / non-linear data structure operations for a given problem.
4	To get familiarized to sorting and searching algorithms.
5	To apply appropriate hash functions that result in a collision free scenario for data storage.

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

Course Description: Understanding, implementing data structures in C and enhancing problem-solving skills.

Course Content

LIST OF EXPERIMENTS

1. Array implementation of List ADT
2. Array implementation of Stack and Queue ADTs
3. Linked list implementation of List ADTs
4. Linked list implementation of Stack and Queue ADTs
5. Applications of List ADTs
6. Applications of Stack and Queue ADTs
7. Development of real time C applications
8. Implementation of Binary Trees and operations of Binary Trees
9. Implementation of Binary Search Trees
10. Implementation of searching techniques
11. Implementation of Sorting algorithms : Insertion Sort
12. Implementation of Sorting algorithms : Quick Sort
13. Implementation of Sorting algorithms : Merge Sort
14. Implementation of Hashing – any two collision techniques

Total Periods	**30**

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

CO 1	Write functions to implement linear and non-linear data structure operations.	K3
CO 2	Use different constructs of C and develop applications.	K3
CO 3	Suggest and use the appropriate linear / non-linear data structure operations for a given problem.	K4
CO 4	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.	K4
CO 5	Implement Sorting and searching algorithms for a given application.	K4

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	3	1	-	2	-	-	1	-	-	-	-
CO2	3	3	1	-	2	-	-	1	-	-	-	-
CO3	3	3	1	-	2	-	-	1	-	-	-	-
CO4	3	3	1	-	2	-	-	1	-	-	-	-
CO5	3	3	1	-	2	-	-	1	-	-	-	-

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. D. NAGESWARI & Mrs. N. Revathi Electronics & Communication Engg. Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr. V. JAYARAJ
Professor & Head
Department of ECE
Nehru Inst of Engg. & Technology
T.M. Palayam, Coimbatore - 641 105

Semester–IV

S.No.	Course Code	Course Title	Category	L	T	P	Contact Period	C
THEORY								
1	U23GE401	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
2	U23RS402	Random Processes and Statistics	BSC	3	1	0	4	4
3	U23EC403	Electromagnetic Fields	PCC	3	0	0	3	3
4	U23EC404	Linear Integrated Circuits	PCC	3	0	0	3	3
5	U23EC405	Control Systems Engineering	PCC	3	0	0	3	3
6		Mandatory Course – II	MC	3	0	0	3	0
THEORY WITH INTEGRATED LAB								
7	U23EC406	Analog and Digital Communication	PCC	3	0	2	5	4
PRACTICAL								
8	U23EC417	Linear Integrated Circuits 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				**20**	**1**	**8**	**29**	**22**

NCC / NSS / YRC / RRC / Sports Credit Course level 2 is offered for students. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.

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	PSO3
CO1	1	1	1
CO2	1	1	1
CO3	1	1	1
CO4	1	1	1
CO5	1	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
A. Lakshmi Priya 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					
U23RS402	RANDOM PROCESSES AND STATISTICS					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	Matrices and Calculus, Liner Algebra and Probability					

Course Objectives

1	To introduce the basic concepts of two dimensional random variables
2	To develop an understanding of Random Process.
3	To understand the study of Sampling Distribution
4	To provide estimation techniques to solve problems.
5	To introduce the statistical concepts such as design of experiments.

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 and Statistics. Students will be able to solve problems related to engineering applications by using these techniques.

Course Content

Unit	Description	
I	**TWO DIMENSIONAL RANDOM VARIABLES:** Introduction – Joint probability distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables.	
	Contact Periods	**12**
II	**RANDOM PROCESSES:** Definition, examples, Expected values, autocorrelation, Properties of autocorrelation, Stationary processes, WSS, cross-correlation, Properties of cross correlation.	
	Contact Periods	**12**
III	**SAMPLING DISTRIBUTION:** Introduction to sampling distributions, sampling distribution of sample mean, sample variance, approximating Binomial with normal distributions, application of central limit theorem, sampling techniques.	
	Contact Periods	**12**
IV	**ESTIMATION THEORY:** Unbiased estimators – Efficiency – Consistency – Sufficiency – Robustness – Method of moments –Method of maximum Likelihood – Interval estimation of Means – Differences between means, variations and ratio of two variances.	
	Contact Periods	**12**
V	**HYPOTHESIS TESTING:** Testing of hypothesis about population parameters, Statistical test of hypothesis – Tests for single mean, proportion and difference of means (Large and small samples) – Essentials of the test, calculating the p-value, two types of errors, power of a statistical test.	
	Contact Periods	**12**
	Total Periods	**60**

Course Outcomes Upon successful completion of the course, students will be able to:		
CO 1	Remember the basic concepts of two dimensional random variables for practical problems.	K1
CO 2	Understand the knowledge of Random Process.	K3
CO 3	Understand the techniques of distribution to solve Sampling Distribution in engineering problems.	K2
CO 4	Understand the techniques of distribution to solve problems in Estimation Theory.	K2
CO 5	Understand the techniques of distribution to solve problems in Hypothesis Testing.	K2
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		
Text Books	1. Yates. R.D. and Goodman. D.J., "Probability and Stochastic Processes", 2nd Edition, Wiley India Pvt. Ltd., Bangalore, 2012. 2. S. Ross, First Course in Probability, Eighth Edition, Prentice-Hall, 2010. 3. Peyton Peebles, Probability, Random Variables and Random Signal Principles, McGraw Hill Education; 4th edition, 2017.	
Reference Books	1. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020. 2. Douglas C. Montgomery & George C. Runger, "Applied Statistics and Probability for Engineers ", 7th Edition, John Wiley and Sons, USA, 2018. 3. Miller. S.L. and Childers. D.G., "Probability and Random Processes with Applications to Signal Processing and Communications", Academic Press, 2004. 4. Veerarajan, T, "Probability, Statistics, Random Processes and Queuing Theory", 1st Edition, Tata McGraw-Hill, New Delhi, 2019. 5. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th 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	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	PSO3
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. A. Sangeetha Devi 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					
U23EC403	ELECTROMAGNETIC FIELDS					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	NIL					

Course Objectives	
1	To impart knowledge on the basics of static electric field and the associated laws.
2	To impart knowledge on the basics of static magnetic field and the associated laws.
3	To give insight into coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations.
4	To gain the behavior of the propagation of EM waves.
5	To study the significance of Time varying fields.

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

Course Description: This course is designed to develop the understanding the basics of static electromagnetic field and the associated laws.

Course Content

Unit	Description	
I	**INTRODUCTION:** Electromagnetic model, Units and constants, Review of vector algebra, Rectangular, cylindrical and spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem.	
	Contact Periods	**09**
II	**ELECTROSTATICS :** Electric field, Coulomb's law, Electric potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density and dielectric constant, Gauss's law and applications, Boundary conditions, Capacitance, Parallel, cylindrical and spherical capacitors, Electrostatic energy, Poisson's and Laplace's equations.	
	Contact Periods	**09**
III	**MAGNETOSTATICS:** Lorentz force equation, Ampere's law, Vector magnetic potential, Biot-Savart law and applications, Magnetic field intensity and idea of relative permeability, Boundary conditions, Inductance and inductors, Magnetic energy, Magnetic forces and torques.	
	Contact Periods	**09**
IV	**TIME-VARYING FIELDS AND MAXWELL's EQUATIONS:** Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields	
	Contact Periods	**09**
V	**PLANE ELECTROMAGNETIC WAVES:** Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence	

	at a plane dielectric boundary.
Contact Periods	**09**
Total Periods	**45**

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

CO 1	Relate the fundamentals of vector, coordinate system to electromagnetic concepts.	K2
CO 2	Analyze the characteristics of electrostatic field.	K4
CO 3	Interpret the concepts of Electric field in material space and solve the boundary conditions.	K2
CO 4	Explain the concepts and characteristics of Magneto Static field in material space and solve boundary conditions.	K2
CO 5	Determine the significance of time varying fields.	K2

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

Text Books	1. D.K. Cheng, Field and wave electromagnetics, 2nd ed., Pearson (India), 2002. 2. M.N.O.Sadiku and S.V. Kulkarni, Principles of electromagnetics, 6th ed., Oxford (AsianEdition), 2015.
Reference Books	1. Edward C. Jordan & Keith G. Balmain, Electromagnetic waves and Radiating Systems, Second Edition, Prentice-Hall Electrical Engineering Series, 2012. 2. W.H. Hayt and J.A. Buck, Engineering Electromagnetics, 7th ed., McGraw-Hill (India), 2006. 3. B.M. Notaros, Electromagnetics, Pearson: New Jersey, 2011.

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	-	-	-	-	-	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	2	-	-
CO2	2	-	-
CO3	2	-	-
CO4	2	-	-
CO5	2	-	-

Course designed by	Verified by
R. S Signature of the Faculty Member	Signature of the Chairperson-BoS
Mrs. R. Saranya Electronics & communication Engg Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr. V. JAYARAJ
Professor & Head
Department of ECE
Nehru Inst. of Engg. & Technology
T.M. Palayam, Coimbatore - 641 105

Course Code	Title					
U23EC404	LINEAR INTEGRATED CIRCUITS					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Electronic Circuits					

Course Objectives	
1	To introduce the basic building blocks of linear integrated circuits.
2	To learn the linear and non-linear applications of operational amplifiers.
3	To introduce the theory and applications of analog multipliers and PLL.
4	To learn the theory of ADC and DAC.
5	To introduce the concepts of waveform generation and introduce some special function ICs.

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

Course Description: This course is designed to provide a comprehensive understanding of differentiate IC and Discrete components, understand manufacturing process of IC and analyze how monolithic components are being developed and their applications.

Course Content

Unit	Description	
I	**BASICS OF OPERATIONAL AMPLIFIERS:** Basic information about op-amps – Ideal Operational Amplifier – General operational amplifier stages – Internal circuit diagrams of IC741, DC and AC performance characteristics, slew rate, Open and closed loop configurations	
	Contact Periods	**09**
II	**APPLICATIONS OF OPERATIONAL AMPLIFIERS:** Adder, Subtractor, Integrator, Differentiator, Comparators, Instrumentation amplifier, Schmitt trigger, Precision rectifier, Clipper and Clamper – Active filters: Low-pass, High-pass filters.	
	Contact Periods	**09**
III	**ANALOG MULTIPLIER AND PLL:** Analog Multiplier using Emitter Coupled Transistor Pair – Gilbert Multiplier cell – Variable transconductance technique – Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator – Monolithic PLL IC 565, Application of PLL: FM detection, Frequency synthesizing.	
	Contact Periods	**09**
IV	**ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS:** Analog and Digital Data Conversions, D/A converter: Weighted resistor type, R-2R Ladder type, Voltage Mode and Current Mode R-2R Ladder types – Switches for D/A converters, High speed sample-and-hold circuits – A/D Converters: Flash type – Successive Approximation type, Single Slope type, Dual Slope type, Sigma–Delta converters.	
	Contact Periods	**09**

V	**WAVEFORM GENERATORS AND SPECIAL FUNCTION IC'S:** Sine-wave generators, Triangular wave generator, Saw-tooth wave generator, Multivibrators: Astable, Monostable Multivibrators using Timer IC 555, IC 723 general purpose regulator – Frequency to Voltage and Voltage to Frequency converters.	
	Contact Periods	**09**
	Total Periods	**45**
Course Outcomes: **Upon successful completion of the course, students will be able to:**		
CO 1	Understand the basic characteristics of Operational amplifiers.	K2
CO 2	Design linear and nonlinear applications of OP –AMPS.	K3
CO 3	Design applications using analog multiplier and PLL.	K3
CO 4	Design ADC and DAC using OP – AMPS.	K3
CO 5	Generate waveforms using OP – AMP Circuits and Analyze special function ICs.	K2
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		
Text Books	1. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd.,2018, Fifth Edition. 2. Sergio Franco, "Design with Operational Amplifiers and Analog Integrated Circuits", 4th Edition, Tata McGraw-Hill, 2016.	
Reference Books	1. Ramakant A. Gayakwad, "OP-AMP and Linear ICs", 4th Edition, Prentice Hall / Pearson Education, 2015. 2. Robert F.Coughlin, Frederick F.Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth Edition, PHI, 2001. 3. S.Salivahanan & V.S. Kanchana Bhaskaran, "Linear Integrated Circuits", TMH, 2nd Edition, 4th Reprint, 2016. 4. https://www.ti.com/product/INA185-Q1 5. https://toshiba.semicon-storage.com/ap-en/top.html	

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	-	-	-	-	-	-	-	-	-
CO2	3	2	1	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	2	1	1
CO2	2	1	1
CO3	2	1	1
CO4	2	1	1
CO5	2	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Mrs. N. Revathi Electronics & Communication Engg Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr. V. JAYARAJ
Professor & Head
Department of ECE
Nehru Inst. of Engg. & Technology
T.M. Palayam, Coimbatore - 641 105

Course Code	Title					
U23EC405	CONTROL SYSTEMS ENGINEERING					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Signals and Systems					

Course Objectives	
1	To introduce the components and their representation of control systems.
2	To learn time response analysis of a system.
3	To learn frequency response analysis of a system.
4	To understand the stability analysis using Routh and root locus techniques.
5	To analyse the design of compensators.

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

Course Description: This course is designed to explore the basic elements and modelling of systems. It also focuses on assessing dynamics system characteristics across varying time and frequencies.

Course Content

Unit	Description	
I	**SYSTEMS COMPONENTS AND THEIR REPRESENTATION:** Control System: Terminology and Basic Structure – Feed forward and Feedback control theory – Electrical and Mechanical Transfer Function Models – Block diagram Models – Signal flow graphs models.	
	Contact Periods	**09**
II	**TIME RESPONSE ANALYSIS:** Transient response – steady state response – Measures of performance of the standard first order and second order system – effect on an additional zero and an additional pole – steady error constant and system – type number – PID control – Analytical design for PD, PI, PID control systems.	
	Contact Periods	**09**
III	**FREQUENCY RESPONSE AND SYSTEM ANALYSIS:** Closed loop frequency response – Performance specification in frequency domain – Frequency response of standard second order system – Bode Plot – Polar Plot – Nyquist plots.	
	Contact Periods	**09**
IV	**CONCEPTS OF STABILITY ANALYSIS:** Concept of stability-Bounded – Input Bounded – Output stability – Routh stability criterion – Relative stability – Root locus concept – Guidelines for sketching root locus – Nyquist stability.	
	Contact Periods	**09**
V	**DESIGN OF COMPENSATOR:** Introduction, classification, Design of Lag, Lead and Lag-Lead compensators using Bode plots.	

	Contact Periods	**09**
	Total Periods	**45**
Course Outcomes: **Upon successful completion of the course, students will be able to:**		
CO 1	Compute the transfer function of different physical systems.	K2
CO 2	Analyse the time domain specification and calculate the steady state error.	K4
CO 3	Illustrate the frequency response characteristics of open loop and closed loop system response.	K2
CO 4	Analyse the stability using Routh and root locus techniques	K4
CO 5	Analyse the design of compensators.	K4
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		

Text Books	1. M.Gopal, "Control System – Principles and Design", Tata McGraw Hill, 4th Edition, 2012.
Reference Books	1. J.Nagrath and M.Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007. 2. K.Ogata, "Modern Control Engineering", PHI, 5th Edition, 2012. 3. S.K.Bhattacharya, "Control System Engineering", Pearson, 3rd Edition, 2013. 4. Benjamin.C.Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition, 1995.

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	-	-	-	-	-	-	-	-
CO2	3	2	1	1	-	-	-	-	-	-	-	-
CO3	3	2	1	1	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	-	-	-
CO5	3	2	1	1	-	-	-	-	-	-	-	-

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	2	2	1
CO2	2	2	1
CO3	2	2	1
CO4	2	2	1
CO5	2	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Mrs. S. M. Deepa Electronics & Communication Engg Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr. V. JAYARAJ
Professor & Head
Department of ECE
Nehru Inst. of Engg. & Technology
T.M. Palayam, Coimbatore - 641 105

Course Code	Title					
U23EC406	ANALOG AND DIGITAL COMMUNICATION					
Semester: IV	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	3	0	2	4		
Course Pre-requisites	Electronic Circuits					

Course Objectives

1	To study different analog modulation.
2	To expose various pulse modulation techniques.
3	To learn the principles of information theory and coding.
4	To learn about digital modulation techniques.
5	To understand the concept of various error control codes.

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

Course Description: This course is designed to provide a comprehensive understanding of Analog and Digital Communication Systems that are used for transmission of information from the source to the destination.

Course Content

Unit	Description	
I	**ANALOG MODULATION:** Principles of Amplitude Modulation Systems – DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals – Modulators and Demodulators.	
	Contact Periods	**09**
II	**PULSE MODULATION:** Sampling process – Pulse Amplitude Modulation, Pulse code Modulation, Differential pulse code modulation, Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.	
	Contact Periods	**09**
III	**INFORMATION THEORY AND CODING:** Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit. RZ and NRZ coding.	
	Contact Periods	**09**
IV	**DIGITAL MODULATION:** Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers.	
	Contact Periods	**09**
V	**ERROR CONTROL CODING:** Channel coding theorem - Linear Block codes - Hamming codes - Cyclic codes – Convolutional codes - Viterbi Decoder.	

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

LIST OF EXPERIMENTS

1. AM- Modulator and Demodulator.
2. FM - Modulator and Demodulator.
3. Pre-Emphasis and De-Emphasis.
4. Pulse Code Modulation and Demodulation.
5. Pulse Amplitude Modulation and Demodulation.
6. Digital Modulation – ASK, PSK, FSK.
7. Delta Modulation and Demodulation.
8. Simulation of ASK, FSK, and BPSK Generation and Detection Schemes.
9. Simulation of DPSK, QPSK and QAM Generation and Detection Schemes.
10. Simulation of Linear Block and Cyclic Error Control coding Schemes.
11. Study of Spectrum Analyzer.

Total Periods	**30**

Course Outcomes:

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

CO 1	Understand different analog modulation schemes.	K2
CO 2	Understand different pulse modulation schemes.	K2
CO 3	Apply principles of information theory and coding.	K3
CO 4	Examine the performance of various digital carrier modulation schemes.	K2
CO 5	Design and implement Error control coding schemes.	K4

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

Text Books	1. Herbert Taub and Donald L. Schilling, "Principles of Communication Systems", Tata McGraw Hill. 2. Rishabh Anand, Communication Systems, Khanna Publishing House, Delhi.
Reference Books	1. B. P. Lathi, "Modern Digital and Analog communication Systems", 3rd Edition, Oxford University Press. 2. Simon Haykin, "Communication Systems", 4th Edition, Wiley India. 3. H. P. Hsu & D. Mitra "Analog and Digital Communications", 2nd Edition, Tata McGraw-Hill.

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	2	1	1	-	-	-	-	-	-	1
CO2	3	3	2	1	1	-	-	-	-	-	-	1
CO3	3	3	2	1	1	-	-	-	-	-	-	1
CO4	3	3	2	1	1	-	-	-	-	-	-	1
CO5	3	3	2	1	1	-	-	-	-	-	-	1

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Nagarajan Electronics & Communication Engg. Name and Department of the Faculty Member	Dr. V. JAYARAJ Professor & Head Department of ECE Name and Seal of the Chairperson-BoS T.M. Palayam, Coimbatore - 641 105

Course Code	Title					
U23EC417	LINEAR INTEGRATED CIRCUITS LABORATORY					
Semester: IV	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	Electronic Circuits					

Course Objectives

1	To gain hands on experience in designing electronic circuits.
2	To learn simulation software used in circuit design.
3	To learn the fundamental principles of amplifier circuits.
4	To differentiate feedback amplifiers and oscillators.
5	To differentiate the operation of various multivibrators

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

Course Description: This course is designed to provide a comprehensive understanding of differentiate IC and Discrete components, understand manufacturing process of IC and analyze how monolithic components are being developed and their applications.

Course Content

LIST OF EXPERIMENTS

1. Inverting and Non-Inverting Amplifier using Op-Amp.
2. RC Phase shift oscillator and Wien Bridge Oscillator using Op-Amp.
3. Hartley Oscillator and Colpitts Oscillator using Op-Amp.
4. RC Integrator and Differentiator circuits using Op-Amp.
5. Clippers and Clampers.
6. Instrumentation amplifier.
7. Active low-pass, High pass & Band pass filters.
8. PLL Characteristics and its use as frequency multiplier, clock synchronization.
9. R-2R ladder type D-A converter using Op-Amp.
10. SIMULATION USING SPICE (Using Op-Amp)
11. Tuned Collector Oscillator.
12. Twin -T Oscillator / Wein Bridge Oscillator.
13. Double and Stagger tuned Amplifiers.
14. Bistable Multivibrator.
15. Schmitt Trigger circuit with Predictable hysteresis.

Total Periods	**30**

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

CO1	Analyze the Configuration of Operational Amplifier.	K4
CO2	Design oscillators, tuned amplifiers, wave-shaping circuits and multivibrators	K4
CO3	Design and simulate feedback amplifiers, oscillators, tuned amplifiers, wave	K4

	shaping circuits and multivibrators, filters using SPICE Tool.	
CO4	Design amplifiers, oscillators, D-A converters using operational amplifiers.	K4
CO5	Design filters using op-amp and perform an experiment on frequency response.	K4

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	3	1	-	-	-	-	-	-	-	-	2
CO2	3	3	1	-	-	-	-	-	-	-	-	2
CO3	3	3	1	-	-	-	-	-	-	-	-	2
CO4	3	3	1	-	-	-	-	-	-	-	-	2
CO5	3	3	1	-	-	-	-	-	-	-	-	2

3-High; 2-Medium;1-Low

CO \ PSO	PSO1	PSO2	PSO3
CO1	3	2	1
CO2	3	2	1
CO3	3	2	1
CO4	3	2	1
CO5	3	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Mrs. N. Revathi Electronics & communication Engg. Name and Department of the Faculty Member	Dr. V. JAYARAJ Professor & Head Dept. of ECE Nehru Inst. of Engg. & Technology T.M. Palayam, Coimbatore - 641 105 Name and Seal of the Chairperson-BoS