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 ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM

B.E. - (Electrical and Electronics Engineering)

REGULATION - 2023

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION AND MISSION OF THE INSTITUTION

VISION

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

MISSION

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

VISION AND MISSION OF THE DEPARTMENT

VISION

- To produce exemplary competent Electrical and Electronics graduates with high moral values to face the challenges of industry/society

MISSION

- To establish a strong Centre of Excellence for learning and research in Electrical and Electronics Engineering.
- To impart high quality education using innovative teaching-learning methods.
- To create globally recognized professionals in the field of Electrical and Electronics Engineering.
- To encourage entrepreneurship in the area of Energy Engineering by providing proper guidance.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- **PEO1.** Perform well in a professional career and use various soft computing tools to design and develop the various engineering solutions in the field of electrical and electronics engineering.
- **PEO2.** Design and analyze engineering products, practice codes of professional ethics and create awareness regarding moral responsibilities in dealing with environmental and social issues.
- **PEO3.** Converse fluently and precisely in a language well understood by others to convey their ideas and views regarding various issues that arise during their career as professionals and make them realize the importance and benefits of team work.

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)

- **PSO 1**: Design electrical and electronics systems and devices for specific needs of society and industries, considering electrical safety, social and environmental issues.

- **PSO 2**: Understand and apply the technologies like PLC, PMC, process controllers, transducers and HMI in the analysis, design, development and installation of power system and applications.

SCHEME OF EXAMINATION

B.E. / B.Tech. - ELECTRICAL AND ELECTRONICS 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	U23PE203	Physics for Electrical Engineering	BSC	3	40	60	100	3
II	U23GE204	Engineering Graphics	ESC	4	40	60	100	4
II	U23EE205	Electric Circuit Analysis	PCC	4	40	60	100	4
II	U23GE206	Tamils and Technology	HSMC	1	40	60	100	1
PRACTICAL								
II	U23EE217	Electric Circuits 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	**28**	**-**	**-**	**-**	**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	U23EE302	Principles of Signals and Systems	PCC	3	40	60	100	3
III	U23EE303	Electromagnetic Theory	PCC	3	40	60	100	3
III	U23EE304	DC Machines and Transformers	PCC	3	40	60	100	3
III		Mandatory Course – I	MC	3	100	-	100	0
THEORY WITH INTEGRATED LAB								
III	U23EE305	Electronic Devices and Circuits	PCC	4	50	50	100	3
III	U23EE306	Data Structures and Algorithms in C	ESC	4	50	50	100	3
PRACTICAL								
III	U23EE317	DC Machines and Transformers Laboratory	PCC	2	60	40	100	1
ENHANCEMENT COURSES								
III		Skill Enhancement Course - II	SEC	2	100	-	100	1
III		Ability Enhancement Course - II	AEC	2	100	-	100	1
			TOTAL	**30**	**-**	**-**	**-**	**22**

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
IV	U23GE401	Environmental Sciences and Sustainability	BSC	2	40	60	100	2
IV	U23RS402	Random Processes and Statistics	BSC	4	40	60	100	4
IV	U23EE403	Linear and Digital Logic Circuits	PCC	4	40	60	100	4
IV	U23EE404	Transmission and Distribution	PCC	3	40	60	100	3
IV	U23EE405	Synchronous and Induction Machines	PCC	3	40	60	100	3
IV		Mandatory Course – II	MC	3	100	0	100	0
THEORY WITH INTEGRATED LAB								
IV	U23EE406	Measurements and Instrumentation	PCC	4	50	50	100	3
PRACTICAL								
IV	U23EE417	Linear and Digital Logic Circuits Laboratory	PCC	2	60	40	100	1
IV	U23EE418	Synchronous and Induction Machines 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	**31**	**-**	**-**	**-**	**23**

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD / WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
V	U23EE501	Power Electronics	PCC	3	40	60	100	3
V	U23EE502	Microprocessor and Microcontroller based System Design	PEC	3	40	60	100	3
V		Professional Elective – I	OEC	3	40	60	100	3
THEORY WITH INTEGRATED LAB								
V	U23EE504	Power System Analysis	PCC	5	50	50	100	4
V	U23EE505	Control Systems	PCC	5	50	50	100	4
PRACTICAL								
V	U23EE516	Microprocessor and Microcontroller Laboratory	PCC	2	60	40	100	1
V	U23EEC517	Internship*	EEC	-	60	40	100	2
ENHANCEMENT COURSES								
V		Skill Enhancement Course - IV	SEC	2	100	-	100	1
V		Ability Enhancement Course - III	AEC	2	100	-	100	1
			TOTAL	**25**	**-**	**-**	**-**	**22**

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
VI	U23EE601	Artificial Intelligence and Machine Learning	PCC	3	40	60	100	3
VI	U23EE602	Solid State Drives	PCC	3	40	60	100	3
VI		Open Elective – I	PEC	3	40	60	100	3
VI		Open Elective - II	OEC	3	40	60	100	3
THEORY WITH INTEGRATED LAB								
VI	U23EE605	Professional Elective – II	PCC	4	50	50	100	3
PRACTICAL								
VI	U23EE616	Power Electronics and Drives Laboratory	PCC	2	60	40	100	1
VI	U23EE617	Mini Project	PCC	6	60	40	100	3
ENHANCEMENT COURSES								
VI		Skill Enhancement Course - V	SEC	2	100	-	100	1
			TOTAL	**26**	**-**	**-**	**-**	**20**

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
VII	U23HS701	Human Values and Ethics	HSMC	3	40	60	100	3
VII	U23EE702	Protection and Switchgear	PCC	3	40	60	100	3
VII		Open Elective - III	OEC	3	40	60	100	3
VII		Open Elective - IV	OEC	3	40	60	100	3
THEORY WITH INTEGRATED LAB								
VII		Professional Elective - III	PEC	4	50	50	100	3
PRACTICAL								
VII	U23EE716	Project Phase - I	EEC	8	60	40	100	4
			TOTAL	**24**	**-**	**-**	**-**	**19**

SEMESTER	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIOD/ WEEK	EXAMINATION MARKS			CREDITS
					CIA	ESE	TOTAL	
THEORY								
VIII		Professional Elective - IV	PEC	3	40	60	100	3
PRACTICAL								
VIII	U23EE812	Project Phase - II	EEC	20	60	40	100	10
			TOTAL	**23**	**-**	**-**	**-**	**13**

CURRICULUM
AND
SYLLABUS

B.E / B.Tech - Electrical and Electronics 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					
U23HS101	PROFESSIONAL ENGLISH - I					
Semester: I	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Higher Secondary Level & Bridge Course					

Course Objectives

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

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

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

Course Content

Unit	Description	
I	**INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION**: Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).	
	Contact Periods	**09**
II	**NARRATION AND SUMMATION**: Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing - Paragraph writing Short Report on an event (field trip etc.) Grammar - Past tense (simple); Subject - Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes & suffixes); Synonyms and Antonyms. Phrasal verbs.	
	Contact Periods	**09**
III	**DESCRIPTION OF A PROCESS / PRODUCT**: Reading - Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).	
	Contact Periods	**09**
IV	**CLASSIFICATION AND RECOMMENDATIONS**: Reading - Newspaper articles; Journal reports - and Non-Verbal Communication (tables, pie charts etc.,). Writing - Note-making / Notetaking (Study skills to be taught, not tested); Writing recommendations; Transferring information from nonverbal (chart, graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.	

	Contact Periods	**09**
V	**EXPRESSION**: Reading - Reading editorials; and Opinion Blogs; Writing - Essay Writing (Descriptive or narrative). Grammar - Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.	
	Contact Periods	**09**
	Total Periods	**45**

Course Outcomes

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

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

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

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

Tools for Assessment (40 Marks)

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

Mapping

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

3-High; 2-Medium; 1-Low

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

Course designed by	Verified by
R.Hey	
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Deepa ASP-CS&H	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					
U23MA102	MATRICES AND CALCULUS					
Semester: I	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	Higher Secondary Level Bridge Course					

Course Objectives

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

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

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

Course Content

Unit	Description	
I	**MATRICES:** Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.	
	Contact Periods	**12**
II	**DIFFERENTIAL CALCULUS:** Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rules (sum, product, quotient, chain rules) – Implicit differentiation – Logarithmic differentiation – Applications : Maxima and Minima of functions of one variable.	
	Contact Periods	**12**
III	**FUNCTIONS OF SEVERAL VARIABLES:** Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.	
	Contact Periods	**12**
IV	**INTEGRAL CALCULUS:** Definite and Indefinite integrals – Substitution rule – Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions – Improper integrals – Applications : Hydrostatic force and pressure, moments and centres of mass.	
	Contact Periods	**12**

V	**MULTIPLE INTEGRALS:** Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications : Moments and centres of mass, moment of inertia.	
	Contact Periods	**12**
	Total Periods	**60**
Course Outcomes		
Upon successful completion of the course, students will be able to:		
CO 1	Apply the matrix algebra methods for solving practical problems.	K3
CO 2	Apply differential calculus tools in solving various application problems	K3
CO 3	Apply differential calculus ideas on several variable functions	K3
CO 4	Apply different methods of integration in solving practical problems	K3
CO 5	Understand the multiple integral ideas in solving areas, volumes and other practical problems	K2
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		
Text Books	1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley, 10th Edition, 2020. 2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018. 3. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].	
Reference Books	1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016. 2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009. 3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016. 4. Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S.Viswanathan Publishers Pvt. Ltd., Chennai, 2009. 5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016. 6. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics" Oxford University Press, 2015. 7. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus ", 14th Edition, Pearson India, 2018.	

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

Mapping

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

3-High; 2-Medium; 1-Low

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

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. A. Sangeetha Devi Associate Professor of Maths Department of 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					
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
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

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

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

Course Objectives

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

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

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

Course Content

Unit	Description	
I	**WATER AND ITS TREATMENT:** Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.	
		Contact Periods 09
II	**NANOCHEMISTRY**: Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.	
		Contact Periods 09
III	**PHASE RULE AND COMPOSITES**: Phase rule: Introduction, definition of terms with examples. One component system - water system; reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; two component system: lead-silver system - Pattinson process. Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fibre, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.	
		Contact Periods 09

IV	**FUELS AND COMBUSTION**: Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO2 emission and carbon foot print.	
	Contact Periods	**09**
V	**ENERGY SOURCES AND STORAGE DEVICES**: Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion battery; Electric vehicles – working principles; Fuel cells: H2-O2 fuel cell, microbial fuel cell; Super capacitors: Storage principle, types and examples.	
	Contact Periods	**09**
	Total Periods	**45**

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

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

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

Text Books	1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018. 2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008. 3. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018.
Reference Books	1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Textbook of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018. 2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017. 3. Friedrich Emich, "Engineering Chemistry", Scientific International Pvt Ltd, New Delhi, 2014. 4. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.

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

Tools for Assessment (40 Marks)

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

Mapping

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

3-High; 2-Medium; 1-Low

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

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

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

Course Objectives

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

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

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

Course Content

Unit	Description	
I	**COMPUTATIONAL THINKING AND PROBLEM SOLVING:** Fundamentals of Computing – Identification of Computational Problems -Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion); Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi	
		Contact Periods 09
II	**DATA TYPES, EXPRESSIONS, STATEMENTS:** Python interpreter and interactive mode, debugging; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.	
		Contact Periods 09
III	**CONTROL FLOW, FUNCTIONS, STRINGS:** Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif- else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as array; Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.	
		Contact Periods 09
IV	**LISTS, TUPLES, DICTIONARIES:** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.	
		Contact Periods 09
V	**FILES, MODULES, PACKAGES:** Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).	
		Contact Periods 09

	Total Periods	45
Course Outcomes **Upon successful completion of the course, students will be able to:**		
CO 1	Solve logical problems through Flowcharts, Algorithms and Pseudo Code.	K2
CO 2	Illustrate the syntax of Python Programming for Solving Problems.	K2
CO 3	Apply the Control Flow Statements and Functions for Solving Searching Techniques.	K3
CO 4	Employ Python Data Structures for Solving Sorting Techniques.	K4
CO 5	Read and Write data from/to files using Python.	K4
Text Books	1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016. 2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and programming", 1st Edition, BCS Learning & Development Limited, 2017.	
Reference Books	1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021. 2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientist s", 1st Edition, Notion Press, 2021. 3. John V Guttag, & Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data '', Third Edition, MIT Press 2021. 4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019. 5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.	

Tools for Assessment (40 Marks)

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

Mapping

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

3-High; 2-Medium; 1-Low

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

CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
P. Priyadharsini AP/CSBS 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
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

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

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

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

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

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

Course Content

LIST OF EXPERIMENTS

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

Contact Periods	**60**

Course Outcomes

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

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

CO 5	Utilize Python packages in developing software applications.	K4

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

Tools for Assessment (40 Marks)

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

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

Mapping

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

3 – High 2-Medium 1-Low

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

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
P. Priyaatharsini AP/CSBS 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 Tamil India Name and Seal of the Chairperson-BoS

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

Course pre-requisites	**Higher Secondary Level, Volumetric analysis**

Course Objectives

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

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

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

Course Content

PHYSICS LABORATORY

LIST OF EXPERIMENTS (Any Seven)

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

Contact Periods 30

CHEMISTRY LABORATORY

LIST OF EXPERIMENTS (Any Seven)

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard.
2. Determination of types and amount of alkalinity in a water sample.
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.

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

Contact Periods	30

Course Outcomes

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

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

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

Tools for Assessment (40 Marks)

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

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

Mapping

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

3-High; 2-Medium; 1-Low

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

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

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

Course pre-requisites	**Higher Secondary Level**

Course Objectives

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

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

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

Course Content

LIST OF EXPERIMENTS

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

Contact Periods	**30**

Course Outcomes

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

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

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

Tools for Assessment (40 Marks)

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

Tools for Assessment (20 Marks)

Model Exam I	Model Exam II	Total
50	50	100

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

3-High; 2-Medium; 1-Low

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

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

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	U23PE203	Physics for Electrical Engineering	BSC	3	0	0	3	3
4	U23GE204	Engineering Graphics	ESC	4	0	0	4	4
5	U23EE205	Electric Circuit Analysis	PCC	3	1	0	4	4
6	U23GE206	Tamils and Technology	HSMC	1	0	0	1	1
PRACTICAL								
7	U23EE217	Electric Circuits Laboratory	PCC	0	0	2	2	1
8	U23GE218	Engineering Practices Laboratory	ESC	0	0	2	2	1
ENHANCEMENT COURSES								
9		Skill Enhancement Course –I	SEC	0	0	2	2	1
10		Value Enhancement Course – I	VEC	0	0	2	2	1
11		Ability Enhancement Course – I	AEC	0	0	2	2	1
			TOTAL	**16**	**2**	**10**	**28**	**23**

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
CO1	-	2
CO2	-	2
CO3	-	2
CO4	-	2
CO5	-	2

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. R. Deepa ASP-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					
U23MA202	NUMERICAL METHODS AND COMPLEX FUNCTIONS					
Semester: II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	Higher Secondary Level Bridge Course, Matrices and Calculus					

Course Objectives

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

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

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

Course Content

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

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

Course Outcomes

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

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

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

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

Tools for Assessment (40 Marks)

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

Mapping

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

3-High; 2-Medium; 1-Low

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

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr.A.Sangeetha Devi Associate professor of Maths Department of 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					
U23PE203	PHYSICS FOR ELECTRICAL 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 dielectric materials and insulation.
2	To understand the electrical properties of materials including free electron theory, applications of quantum mechanics.
3	To instil knowledge on physics of semiconductors, determination of charge carriers and device applications.
4	To establish a sound grasp of knowledge on different optical properties of materials, optical displays, and Applications.
5	To inculcate an idea of significance of nano structures, quantum confinement and ensuing nano device 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	**DIELECTRIC MATERIALS AND INSULATION:** Fundamental of dielectric materials- Types of Polarizations - The internal field- derivation of Clausius - Mosotti relation- Behaviour of dielectrics in an alternating field - Dielectric breakdown. Introduction to insulation materials (gases, liquids, and solids) - Capacitor materials -Typical capacitor constructions - Piezo, Pyro and Ferro electric crystals.	
	Contact Periods	09
II	**ELECTRICAL PROPERTIES OF MATERIALS:** Classical free electron theory - Expression for electrical conductivity - Thermal conductivity, expression - Wiedemann-Franz law - Success and failures - Electrons in metals - Particle in a three - Dimensional box - Degenerate states - Fermi-Dirac statistics - Density of energy states.	
	Contact Periods	09
III	**SEMICONDUCTING MATERIALS:** Fundamental of Semiconductors - Carrier concentration in intrinsic semiconductors - Extrinsic semiconductors - Variation of carrier concentration with temperature - Variation of Fermi level with temperature and impurity concentration - Hall effect and devices - Ohmic contacts - Schottky diode.	
	Contact Periods	09
IV	**OPTICAL PROPERTIES OF MATERIALS:** Classification of optical materials - Optical processes in semiconductors: optical absorption and emission, Charge injection and recombination, optical absorption, loss, and gain. Optical processes in quantum wells - Optoelectronic devices: Photo detectors, Solar cells - Light emitting diode - Organic light emitting diode - Laser diode.	
	Contact Periods	09

V	**NANO DEVICES:** Quantum confinement - Quantum structures (wells, wires, and dots) - Band gap of nanomaterials -Tunneling - Single electron phenomena - Single Electron Transistor. Ballistic transport Carbon nanotubes: Properties and applications - Spintronic devices and applications - Quantum well laser.	
	Contact Periods	**09**
	Total Periods	**45**

Course Outcomes

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

CO 1	Know basics of dielectric materials and insulation.	K1
CO 2	Gain knowledge on the electrical properties of materials and their applications.	K2
CO 3	Understand clearly of semiconductor physics and functioning of semiconductor devices.	K2
CO 4	Understand the optical properties of materials and working principles of various optical devices.	K2
CO 5	Appreciate the importance of nanodevices.	K4

Text Books

1. S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
2. R.F.Pierret. Semiconductor Device Fundamentals. Pearson (Indian Edition), 2006.
3. G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education (Indian Edition), 2009.

Reference Books

1. Laszlo Solymar, Walsh, Donald, Syms and Richard R.A., Electrical Properties of Materials, Oxford Univ. Press (Indian Edition) 2015.
2. Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Education (Indian Edition), 2019.
3. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
4. Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001.
5. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

Tools for Assessment (40 Marks)

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

Mapping

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

3-High; 2-Medium; 1-Low

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

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

Course Code	Title					
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
CO 1	2	2
CO 2	2	2
CO 3	2	2
CO 4	2	2
CO 5	3	3

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

CourseCode	Title					
U23EE205	ELECTRIC CIRCUIT ANALYSIS					
Semester:II	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	Matrices and Calculus, Engineering Physics					

Course Objectives

1	To introduce electric circuits and its analysis of both DC and AC circuits.
2	To impart knowledge on solving circuit equations using network theorems.
3	To educate on obtaining the transient response of circuits.
4	To introduce the phenomenon of resonance in coupled circuits.
5	To introduce Phasor diagrams and analysis of single &three phase circuits.

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

Course Description: The course helps the students to develop the fundamentals and basic concepts in Electric circuit analysis, Network Theorem, Transients and Resonance circuits. Students will be able to solve problems related to electric circuits' analysis by using these techniques.

Course Content

Unit	Description	
I	**BASIC CIRCUITS ANALYSIS**: Fundamentals concepts of R, L and C elements-Energy Sources-Ohm's Law -Kirchhoff 's Laws – DC Circuits – Resistors in series and parallel circuits - A.C Circuits – Average and RMS Value –Complex Impedance – Phasor diagram - Real and Reactive Power, Power Factor, Energy –Mesh current and node voltage methods of analysis D.C and A.C Circuits.	
	Contact Periods	**12**
II	**NETWORK REDUCTION AND THEOREMS FOR DC AND AC CIRCUITS:** Network reduction: voltage and current division, source transformation – star delta conversion. Theorems – Superposition, Thevenin's and Norton's Theorem – Maximum power transfer theorem –Reciprocity Theorem – Statement, application to DC and AC Circuits.	
	Contact Periods	**12**
III	**TRANSIENT RESPONSE ANALYSIS**: Introduction – Laplace transforms and inverse Laplace transforms- standard test signals –Transient response of RL, RC and RLC circuits using Laplace transform for Source free, Step input and Sinusoidal input.	
	Contact Periods	**12**

IV	**RESONANCE AND COUPLED CIRCUITS**: Series and parallel resonance –frequency response – Quality factor and Bandwidth – Self and mutual inductance – Coefficient of coupling – Dot rule -Analysis of coupled circuits– Single Tuned circuits.	
	Contact Periods	**12**
V	**THREE PHASE CIRCUITS**: Analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced and unbalanced – phasor diagram of voltages and currents – power measurement in three phase circuits– Power Factor Calculations.	
	Contact Periods	**12**
	Total Periods	**60**

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

CO 1	Apply the basic concepts to solve simple AC and DC electric Circuits Problems.	K3
CO 2	Apply network theorems to determine behavior of the given DC and AC circuit.	K3
CO 3	Derive the transient response of circuits with AC and DC Supply.	K3
CO 4	Explain the frequency response of series and parallel RLC circuits and behavior of magnetically coupled circuits.	K4
CO 5	Analyze balanced and Unbalanced three phase AC Circuits and draw the phasor diagram.	K4

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

Text Books	1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, 9thedition, New Delhi, 2020. 2. Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals ofElectric Circuits", Second Edition, McGraw Hill, 2019. 3. Allan H. Robbins, Wilhelm C. Miller, "Circuit Analysis Theory and Practice", Cengage Learning India, 2013.
Reference Books	1. Chakrabarti A, "Circuits Theory (Analysis and synthesis), DhanpatRai& Sons, New Delhi, 2020. 2. Joseph A. Edminister, Mahmood Nahvi, "Electric circuits", Schaum's series, McGraw-Hill, First Edition, 2019. 3. Richard C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 7th Edition, John Wiley Sons, Inc. 2018 4. M E Van Valkenburg, "Network Analysis",Prentice-Hall of IndiaPvt Ltd, New Delhi, 2015 5. Sudhakar A and Shyam Mohan SP, "Circuits and Networks Analysisand Synthesis", McGraHill, 2015

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

CO-PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO 6	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	PSO 1	PSO 2
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
Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr.R.KANNAN
PROFESSOR & HEAD
Department of Electrical & Electronics Engineering
Nehru Institute of Engineering & Technology
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
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. Deepak. A, SSH 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

CourseCode	Title					
U23EE217	ELECTRIC CIRCUITS LABORATORY					
Semester:II	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	Matrices and Calculus, Engineering Physics					

Course Objectives

1	To simulate various electric circuits using Pspice/ MATLAB.
2	To gain practical experience on electric circuits and verification of theorems.
3	To simulate the transient response of an electrics circuits using MATLAB.
4	To design a resonance circuit and sketch its frequency response.
5	To design Phasor diagrams and analysis of three phase circuits.

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

Course Description: The course helps the students to develop the fundamentals and basic practical concepts in Electric circuit analysis, Network Theorem, Transients and Resonance circuits using MATLAB Program.

Course Content

LIST OF EXPERIMENTS

1. Simulation and experimental verification of series and parallel electrical circuit using fundamental laws.
2. Simulation and experimental verification of electrical circuit problems using Thevenin's theorem.
3. Simulation and experimental verification of electrical circuit problems using Norton's theorem.
4. Simulation and experimental verification of electrical circuit problems using Superposition theorem.
5. Simulation and experimental verification of Maximum Power transfer theorem.
6. Simulation and Experimental validation of R-C, R-L and RLC electric circuittransients
7. Simulation and Experimental validation of frequency response of RLC electriccircuit.
8. Design and implementation of series resonance circuit.
9. Design and implementation of Parallel resonance circuit.
10. Simulation and experimental verification of three phase balanced and Unbalanced star/delta networks circuit (Power and Power factor calculations).

	Total	30 Periods
Course Outcomes **Upon successful completion of the course, students will be able to:**		
CO 1	Verify an DC/AC electric circuits using fundamental electrical laws.	K3
CO 2	Verify an DC/AC electric circuits using Network Theorems.	K3
CO 3	Analyze transient behavior of the given RL/RC/RLC circuit using simulation andexperimental methods.	K4
CO 4	Analyze frequency response of the given series and parallel RLC circuit usingsimulation and experimentation methods.	K4
CO 5	Analyze the performance of the given three-phase circuit using simulation andexperimental methods.	K4
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		

Tools for Assessment (40 Marks)

Conduct of Experiments	Conduct of Experiments	Conduct of Experiments	Viva Voce	Total
30	30	30	10	100

Tools for Assessment (20 Marks)

Model Exam I	Model Exam I	Model Exam I
50	50	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	-	1	-	-	1
CO2	3	3	3	3	2	-	-	-	1	-	-	1
CO3	3	3	3	3	2	-	-	-	1	-	-	1
CO4	3	3	3	3	2	-	-	-	1	-	-	1
CO5	3	3	3	3	2	-	-	-	1	-	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO 1	PSO 2
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
Name and Department of the Faculty Member	Name and Seal of the Chairperson-BoS

Dr.R.KANNAN
PROFESSOR & HEAD
Department of Electrical & Electronics Engineering
Nehru Institute of Engineering & Technology
Coimbatore - 641 105.

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
CO 1	2	1
CO 2	2	1
CO 3	2	1
CO 4	2	1
CO 5	3	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	U23EE302	Principles of Signals and Systems	PCC	3	0	0	3	3
3	U23EE303	Electromagnetic Theory	PCC	3	0	0	3	3
4	U23EE304	DC Machines and Transformers	PCC	3	0	0	3	3
5		Mandatory Course – I	MC	3	0	0	3	0
THEORY WITH INTEGRATED LAB								
6	U23EE305	Electronic Devices and Circuits	PCC	2	0	2	4	3
7	U23EE306	Data Structures and Algorithms in C	ESC	2	0	2	4	3
PRACTICAL								
8	U23EE317	DC Machines and Transformers Laboratory	PCC	0	0	2	2	1
ENHANCEMENT COURSES								
9		Skill Enhancement Course –II	SEC	0	0	2	2	1
10		Ability Enhancement Course – II	AEC	0	0	2	2	1
TOTAL				**19**	**1**	**10**	**30**	**22**

Course Code	Title					
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
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. A. Sangeetha Devi Associate professor of Maths Department of 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					
U23EE302	PRINCIPLES OF SIGNALS AND SYSTEMS					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Electric Circuit Analysis					

Course Objectives: To impart knowledge on the following Topics:

1	To understand the basic properties of signal & 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 transform domains.
5	To analyze discrete time signals and system in the Z transform domains.

Course Category	Professional Core Course (PCC)
Development Needs	Global

Course Description: The course helps the students to develop the fundamentals and basic concepts in Linear Time Invariant Continuous Signal and Linear Time Invariant discrete Signal. Students will be able to solve problems related to signal and systems by using Z Transform- and laplace transform techniques.

Course Content

Unit	Description	
I	**CLASSIFICATION OF SIGNALS AND SYSTEMS:** Standard and 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 & Noncausal, Stable & Unstable.	
	Contact Periods	9
II	**ANALYSIS OF CONTINUOUS TIME SIGNALS:** Fourier series for periodic signals - Fourier Transform – properties- Laplace Transforms and properties.	
	Contact Periods	9
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	9
IV	**ANALYSIS OF DISCRETE TIME SIGNALS:** Baseband signal Sampling – Fourier Transform of discrete time signals (DTFT) – Properties of DTFT - Z Transform & Properties	
	Contact Periods	9

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	9
	Total Periods	45

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	Determining the frequency components present in a deterministic signal.	K2
CO 3	Capable of characterizing LTI systems in the time domain and frequency domain.	K3
CO 4	Compute the output of an LTI system in the time domains.	K4
CO 5	Compute the output of an LTI system in the frequency domains.	K4

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

Text Books	1. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, 2015.
Reference Books	1. B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009. 2. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007. 3. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.

Tools for Assessment (40 Marks)

CIAI	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	PSO 1	PSO 2
CO1	1	2
CO2	1	2
CO3	1	2
CO4	1	2
CO5	1	2

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

Course Code	Title					
U23EE303	ELECTROMAGNETIC THEORY					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Numerical Methods and Complex Function, Electric Circuit Analysis					

Course Objectives

1	To introduce the basic mathematical concepts related to electromagnetic vector fields
2	To impart knowledge on the concepts of Electrostatic fields, electric potential, energy density and their applications.
3	To impart knowledge on the concepts of Magneto static fields, magnetic flux density, vector potential and its applications.
4	concepts related to electromagnetic vector fields Different methods of emf generation and Maxwell's equations
5	To impart knowledge on the concepts of Electromagnetic waves and characterizing parameters

Course Category	Professional Core Course (PCC)
Development Needs	Global

Course Description: The course helps the students to develop the fundamentals and basic concepts in Electrostatic and Electromagnetic Circuits. Students will be able to solve problems related to electromagnetic and Wave analysis by using maxwell's techniques.

Course Content

Unit	Description	
I	**ELECTROSTATICS – I:** Sources and effects of electromagnetic fields – Coordinate Systems – Vector fields –Gradient, Divergence, Curl – theorems and applications - Coulomb's Law – Electric field intensity – Field due to discrete and continuous charges – Gauss's law and applications.	
	Contact Periods	9
II	**ELECTROSTATICS – II:** Electric potential – Electric field and equipotential plots, Uniform and Non-Uniform field, Utilization factor – Electric field in free space, conductors, dielectrics - Dielectric polarization –Dielectric strength - Electric field in multiple dielectrics – Boundary conditions, Poisson's and Laplaces equations,Capacitance, Energy density, Applications.	
	Contact Periods	9
III	**MAGNETOSTATICS:** Lorentz force, magnetic field intensity (H) – Biot–Savart's Law - Ampere's Circuit Law – H due to straight conductors, circular loop, infinite sheet of current, Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization, Magnetic field in multiple media –Boundary conditions, scalar and vector potential, Poisson's Equation, Magnetic force, Torque, Inductance, Energy density, Applications.	

	Contact Periods	**9**
IV	**ELECTRODYNAMIC FIELDS:** Magnetic Circuits - Faraday's law – Transformer and motional EMF– Displacement current -Maxwell's equations (differential and integral form) – Relation between field theory and circuit theory – Applications.	
	Contact Periods	**9**
V	**ELECTROMAGNETIC WAVES:** Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting vector – Plane wave reflection and refraction.	
	Contact Periods	**9**
	Total Periods	**45**

Course Outcomes

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

CO 1	Compute different coordinate systems related to magnetic fields.	K3
CO 2	Compute and analyse electrostatic fields, electric potential, energy density along with their applications.	K4
CO 3	Compute and analyse magneto static fields, magnetic flux density, vector potential along with their applications.	K4
CO 4	Explain different methods of emf generation and derive Maxwell's equations.	K4
CO 5	Analyse the concept of electromagnetic waves and characterizing parameters.	K4

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

Text Books	1. Mathew N. O. Sadiku, S.V. Kulkarni 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015 2. William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014. 3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010.
Reference Books	1. V.V.Sarwate, 'Electromagnetic fields and waves', Second Edition, Newage Publishers, 2018. 2. J.P.Tewari, 'Engineering Electromagnetics - Theory, Problems and Applications'.Second Edition, Khanna Publishers 2013. 3. Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Fifth Edition (Schaum's Outline Series), McGraw Hill, 2018.

4. S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2017
5. K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Sixteenth Edition Eighth Reprint :2015

Tools for Assessment (40 Marks)

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

3-High; 2-Medium; 1-Low

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

Course designed by	Verified by

Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Edison prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Nehru Institute of Engineering & Technology Coimbatore - 641 105. Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE304	DC MACHINES AND TRANSFORMERS					
Semester: III	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Electromagnetic Fields					

Course Objectives: To impart knowledge on the:

1	Magnetic-circuit analysis and introduce magnetic materials.
2	Constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
3	Working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.
4	Working principles of DC machines as Generator types, determination of their no load/load characteristics, starting and methods of speed control of motors.
5	Various losses taking place in D.C. Motor and to study the different testing methods to arrive at their performance.

Course Category	Professional Core Course (PCC)
Development Needs	Global

Course Description: The course helps the students to develop the fundamentals and basic concepts in magneto circuits, construction and working principle of DC Motors, Generators and Transformers. Students will be able to solve problems related to electrical machines by using fundamental laws.

Course Content

Unit	Description	
I	**MAGNETIC CIRCUITS AND MAGNETIC MATERIALS:** Magnetic circuits –Laws governing magnetic circuits - Flux linkage, Inductance and energy –Statically and Dynamically induced EMF - Torque – Properties of magnetic materials, Hysteresis and Eddy Current losses - AC excitation, introduction to permanent magnets-Transformer as a magnetically coupled circuit.	
	Contact Periods	9
II	**TRANSFORMERS:** Construction – principle of operation – equivalent circuit parameters – phasor diagrams, losses – testing – efficiency and voltage regulation-all day efficiency-Sumpner's test, per unit representation – inrush current - three phase transformers-connections – Scott Connection – Phasing of transformer– parallel operation of three phase transformers-auto transformer – tap changing transformers- tertiary winding.	
	Contact Periods	9
III	**ELECTRO MECHANICAL ENERGY CONVERSION AND CONCEPTSIN ROTATING MACHINES:** Energy in magnetic system – Field energy and co energy-force and torque equations –singly and multiply excited magnetic field systems-MMF of distributed windings – Winding Inductances-, magnetic fields in rotating machines – rotating MMF waves – magnetic saturation and leakage fluxes.	
	Contact Periods	9

IV	**DC GENERATORS:** Construction and components of DC Machine – Principle of operation - Lap and wave windings-EMF equations– circuit model – armature reaction –methods of excitation commutation – inter poles compensating winding –characteristics of DC generators.	
	Contact Periods	**9**
V	**DC MOTORS:** Principle and operations - types of DC Motors – Speed Torque Characteristics of DC Motors starting and speed control of DC motors –Plugging, dynamic and regenerative braking testing and efficiency – Retardation test- Swinburne's test and Hopkinson's test – Permanent Magnet DC (PMDC)motors-applications of DC Motor.	
	Contact Periods	**9**
	Total Periods	**45**

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

CO 1	Analyze the magnetic-circuits.	K4
CO 2	Acquire the knowledge in constructional details of transformers.	K3
CO 3	Understand the concepts of electromechanical energy conversion.	K2
CO 4	Acquire the knowledge in working principles of DC Generator.	K3
CO 5	Acquire the knowledge in working principles of DC Motor and acquire the knowledge in various losses taking place in D.C. Machines.	K3

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

Text Books	1. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 5th Edition, 2017. 2. P. S. Bimbhra, "Electric Machinery", Khanna Publishers, 2nd Edition, 2021.
Reference Books	1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 6th Edition 2017. 2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2018. 3. M. G. Say, "Performance and design of AC machines", CBS Publishers, First Edition 2008. 4. Sahdev S. K. "Electrical Machines", Cambridge University Press, 2018.

Tools for Assessment (40 Marks)

CIAI	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	-	-	-	-	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	PSO 1	PSO 2
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. K. Edison prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Nehru Institute of Engineering & Technology Coimbatore - 641 105 Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE305	ELECTRONIC DEVICES AND CIRCUITS					
Semester: III	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	2	0	2	3		
Course pre-requisites	Physics for Electrical Engineering, Electric Circuit Analysis					

Course Objectives

1	To understand the structure of basic electronic devices.
2	To be exposed to active and passive circuit elements.
3	To familiarize the operation and applications of transistor like BJT and FET.
4	To explore the characteristics of amplifier gain and frequency response.
5	To learn the required functionality of positive and negative feedback systems.

Course Category	Professional Core Course (PCC)
Development Needs	Global

Course Description: The course helps the students to develop the fundamentals and basic concepts in Electronic circuit and characteristics of analog electronics components. Students will be able to solve problems related to electronic circuits analysis by using these techniques.

Course Content:

Unit	Description	
I	**PN JUNCTION DEVICES:** PN junction diode –structure, operation and V-I characteristics, diffusion and transition capacitance –Clipping & Clamping circuits - Rectifiers – Half Wave and Full Wave Rectifier– Display devices- LED, Laser diodes, Zener diode characteristics- Zener diode Reverse characteristics – Zener diode as regulator.	
	Contact Periods	6
II	**TRANSISTORS AND THYRISTORS:** BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT - Structure and characteristics.	
	Contact Periods	6
III	**AMPLIFIERS:** BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response –MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.	
	Contact Periods	6
IV	**MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER:** BIMOS cascade amplifier, Differential amplifier – Common mode and Difference mode analysis – FET input	

	stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).	
	Contact Periods	**6**
V	**FEEDBACK AMPLIFIERS AND OSCILLATORS:** Advantages of negative feedback – voltage / current, series , Shunt feedback –positive feedback –Condition for oscillations, phase shift – Wien bridge, Hartley, Colpitts and Crystal oscillators	
	Contact Periods	**6**
	Total Periods	**30**

LIST OF EXPERIMENTS

1. Characteristics of Semiconductor diode, Zener diode , photo diode and photo transistor.
2. Characteristics of NPN Transistor under common emitter , common collector and common base configurations.
3. Characteristics of JFET and draw the equivalent circuit.
4. Characteristics of UJT and generation of saw tooth waveforms.
5. Design and frequency response characteristics of a Common Emitter amplifier.
6. Characteristics of light activated relay circuit.
7. Design and testing of RC phase shift and LC oscillators.
8. Characteristics of Single Phase half-wave and full wave rectifiers with inductive and capacitive filters.
9. Design of Differential amplifiers using FET.
10. Measurement of frequency and phase angle using CRO.

	Total Periods	**30**
Course Outcomes		
Upon successful completion of the course, students will be able to:		
CO 1	Understand the structure and application of basic diode.	K2
CO 2	Discuss the working of BJT and its characteristics.	K2
CO 3	Familiarize the operation and applications of MOSFET.	K3
CO 4	Explore the characteristics of amplifier gain and frequency response.	K3
CO 5	Explain the operation of various feedback amplifiers and oscillators.	K4

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

Text Books	1. David A. Bell ,"Electronic devices and circuits", Oxford University higher education, 5th edition 2008. 2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press.
Reference Books	1. Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHI learning private limited, 2nd edition2014. 2. Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10thEdition, 2017. 3. Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2003. 4. Robert L.Boylestad, "Electronic devices and circuit theory", 2002. 5. Robert B. Northrop, "Analysis and Application of Analog Electronic Circuits to BiomedicalInstrumentation". CRC Press, 2004.

Tools for Assessment - Theory

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

Tools for Assessment– Practical

Model Exam I	Model Exam I	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	-	-	1
CO2	3	3	2	1	1	-	-	-	1	-	-	1
CO3	3	3	2	1	1	-	-	-	1	-	-	1
CO4	3	3	2	1	1	-	-	-	1	-	-	1
CO5	3	3	2	1	1	-	-	-	1	-	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	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. K. Edison prabhu AP/ECE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Nehru Institute of Engineering & Technology Coimbatore - 641 105. Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE306	DATA STRUCTURES AND ALGORITHMS IN C					
Semester:	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
III	2	0	2	3		
Course pre-requisites	Problem Solving and Python Programming					

Course Objectives

1	To understand the concepts of ADTs.
2	To understand the concepts of linear data structures.
3	To know the concepts of non-linear data structure and hashing.
4	To familiarize the concepts of sorting techniques.
5	To familiarize the concepts of searching techniques.

Course Category	Engineering Sciences Course (ESC)
Development Needs	Global

Course Description: The course helps the students to develop the fundamentals and basic concepts in Array implementation, linear and non-linear data structures. Students will be able to solve programs related to data structure algorithms by using these techniques.

Course Content:

Unit	Description	
I	**INTRODUCTION:** Abstract Data Types (ADT) – List ADT: Array implementation, Linked list implementation (Singly, Doubly & Circular)–Applications: Polynomial Evaluation	
	Contact Periods	6
II	**LINEAR DATA STRUCTURES – STACKS, QUEUES: Stack ADT:** Array and Linked Stacks, Applications: Arithmetic expression convertion - Postfix evaluation – **Queue ADT:** Array and Linked Queue, Circular Queue – Applications.	
	Contact Periods	6
III	**NON LINEAR DATA STRUCTURES – TREES:** Tree Terminologies – tree traversal - Binary Tree –Threaded Binary Trees - Binary Search Trees – AVL Trees – B-Tree -Heap – Applications.	
	Contact Periods	6

IV	**NON LINEAR DATA STRUCTURES - GRAPHS :** Representation of Graph - Types of graph –Graph traversal – Minimum Spanning Tree - Shortest path algorithm –Topological Sort –Real world applications.	
	Contact Periods	**6**
V	**SORTING AND SEARCHING TECHNIQUES**: **Searching:** Linear and Binary Search – **Sorting:** Bubble sort – Insertion sort – Quick sort - Merge sort – **Hashing:** Hash Functions – Collision Avoidance Techniques: Separate chaining – Open Addressing – Linear probing, Quadratic probing, Double hashing – Rehashing – Applications.	
	Contact Periods	**6**
	Total Periods	**30**

LIST OF EXPERIMENTS

1. Practice of C programming using statements, expressions, decision making and iterative statements
2. Practice of C programming using Functions
3. Practice of C programming using Arrays
4. Implement C programs using Pointers
5. Implement C programs using Structures
6. Applications of List, Stack and Queue ADTs
7. Implementation of Binary Trees and operations of Binary Trees
8. Implementation of Binary Search Trees
9. Mini Projects

Total Periods	**30**

Course Outcomes

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

CO 1	Analyze the representation and manipulation of data structures in memory.	K4
CO 2	Use appropriate linear data structure to solve various applications.	K3
CO 3	Apply the tree concepts for efficient storage and retrieval of data.	K3
CO 4	Apply the graph algorithms to solve real-world challenges.	K3
CO 5	Choose the optimal searching, sorting and hashing techniques to solve real Time applications.	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. ReemaThareja, "Programming in C", Second Edition, Oxford University Press, 2016.

Reference Books	1. Seymour Lipschutz, "Data Structures with C", McGraw Hill, Revised First Edition, 2014 2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education,1983. 3. Ellis Horowitz, Sartaj Sahni and Susan Anderson, "Fundamentals of Data Structures", Galgotia, 2008. 4. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson Education, 2004.

Tools for Assessment - Theory

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

Tools for Assessment– Practical

Model Exam I	Model Exam I	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	-	-	1
CO2	3	3	2	1	1	-	-	-	1	-	-	1
CO3	3	3	2	1	1	-	-	-	1	-	-	1
CO4	3	3	2	1	1	-	-	-	1	-	-	1
CO5	3	3	2	1	1	-	-	-	1	-	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	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. K. Edison prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Coimbatore - 641 105. Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE317	DC MACHINES AND TRANSFORMERS LABORATORY					
Semester: III	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	Electric Circuit Analysis, Electromagnetic fields					

Course Objectives

1	To determine or predetermine the internal and external characteristics of the given DC generators from the test data.
2	To determine or predetermine the performance characteristics of the given DC generators from the test data.
3	To determine or predetermine the performance characteristics of the given DC motors from the test data.
4	To determine or predetermine the performance of speed control of DC motor by different techniques.
5	To determine or predetermine the regulation and efficiency of given transformers from the test data.

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

Course Description: The course helps the students to develop the fundamentals and practical concepts in DC Machines, load test on single phase and three phase transformer. Students will be able to solve problems related to electrical machines by using fundamental laws.

Course Content:

LIST OF EXPERIMENTS

1. Determination of Open circuit and load characteristics of D.C separately excited generator
2. Determination of Open circuit and load characteristics of D.C shunt generator
3. Determination of Load characteristics of D.C compound generator with differential and cumulative connections
4. Determination of Load characteristics of D.C series generator
5. Determination of performance characteristics of D.C shunt and compound motor.
6. Determination of performance characteristics of D.C series motor
7. Implementation of Swinburne's test and speed control of D.C shunt motor
8. Determination of regulation and efficiency of three-phase transformer using load test
9. Implementation of Open circuit and short circuit tests on single-phase transformer
10. Execution of Sumpner's test on transformer

Total Periods 30

Course Outcomes

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

CO 1	Test and analyze the performance of separately and self-excited DC generators.	K4
CO 2	Test and analyze the performance of DC compound and DC series generators.	K4
CO 3	Predetermine and analyze the performance of DC machines.	K4
CO 4	Control the speed of the DC motor by applying different techniques.	K2
CO 5	Test and analyze the performance of transformers.	K4

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

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculation & 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	2	1	1	-	-	-	1	-	-	1
CO2	3	3	2	1	1	-	-	-	1	-	-	1
CO3	3	3	2	1	1	-	-	-	1	-	-	1
CO4	3	3	2	1	1	-	-	-	1	-	-	1
CO5	3	3	2	1	1	-	-	-	1	-	-	1

3-High; 2-Medium; 1-Low

CO \ PSO	PSO1	PSO2
CO1	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. K. Edison prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Name and Seal of the Chairperson-BoS

Semester – IV

S. No.	Course Code	Course Title	Category	L	T	P	Contact Period	C
THEORY								
1	U23GE401	Environmental Sciences and Sustainability	BSC	2	0	0	2	2
2	U23RS402	Random Processes and Statistics	BSC	3	1	0	4	4
3	U23EE403	Linear and Digital Logic Circuits	PCC	3	1	0	4	4
4	U23EE404	Transmission and Distribution	PCC	3	0	0	3	3
5	U23EE405	Synchronous and Induction Machines	PCC	3	0	0	3	3
6		Mandatory Course – II	MC	3	0	0	3	0
THEORY WITH INTEGRATED LAB								
7	U23EE406	Measurements and Instrumentation	PCC	2	0	2	4	3
PRACTICAL								
8	U23EE417	Linear and Digital Logic Circuits Laboratory	PCC	0	0	2	2	1
9	U23EE418	Synchronous and Induction Machines Laboratory	PCC	0	0	2	2	1
ENHANCEMENT COURSES								
10		Skill Enhancement Course –III	SEC	0	0	2	2	1
11		Value Enhancement Course – II	VEC	0	0	2	2	1
TOTAL				**19**	**2**	**10**	**31**	**23**

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

Course Objectives

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

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

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

Course Content

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

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

Course Outcomes:

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

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

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

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

Tools for Assessment (40 Marks)

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

Mapping

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

3-High; 2-Medium; 1-Low

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

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

Course Code	Title					
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:		Knowledge Level
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
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. A. Sangeetha Devi Associate Professor of Maths Department of 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					
U23EE403	LINEAR AND DIGITAL LOGIC CIRCUITS					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	1	0	4		
Course pre-requisites	Electronic Devices and Circuits					

Course Objectives: To impart knowledge on the:

1	Signal analysis using Op-amp based circuits.
2	Applications of Op-amp & IC fabrication procedure.
3	To introduce the fundamentals of combinational and sequential digital circuits.
4	To study implementation of combinational circuits using Gates` and MSI Devices.
5	To study the design of various synchronous and asynchronous circuits.

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

Course Description: The course helps the students to develop the fundamentals and basic concepts in characteristic of OP-Amp, Number systems and design of sequential circuits. Students will be able to solve problems related to analog electronic circuits` and digital electronics circuits analysis by using these techniques

Course Content		
Unit	Description	
I	**IC FABRICATION:** IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.	
	Contact Periods	12
II	**CHARACTERISTICS OF OPAMP:** Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Voltage-shunt feedback and inverting amplifier - Voltage series feedback: and Non-Inverting Amplifier - Basic applications of op-amp –, summer, differentiator and Integrator-V/I & I/V converters.	
	Contact Periods	12
III	**NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES:** Number system, error detection, corrections & codes conversions, Boolean algebra: De-Morgan's theorem, switching functions and minimization using K-maps & Quine McCluskey method - Digital Logic Families -comparison of RTL, DTL, TTL, ECL and MOS families - operation, characteristics of digital logic family.	
	Contact Periods	12

IV	**COMBINATIONAL CIRCUITS:** Combinational logic - representation of logic functions-SOP and POS forms. K-map representations - minimization using K maps - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors, Encoders and Decoders.	
	Contact Periods	**12**
V	**SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL CIRCUITS:** Sequential logic- SR, JK, D and T flip flops - level triggering and edge triggering - counters -asynchronous and synchronous type - Modulo counters - Shift registers - design of synchronous sequential circuits – Moore and Mealy models- Counters, state diagram; state reduction; state assignment. Asynchronous sequential logic Circuits-Transition stability, flow stability-race conditions.	
	Contact Periods	**12**
	Total Periods	**60**

Course Outcomes

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

CO 1	Explain monolithic IC fabrication process.	K2
CO 2	Explain the fabrication of diodes, capacitance, resistance, FETs and PV Cell, Analyze the characteristics and basic applications (inverting/non-inverting amplifier, summer, differentiator, integrator, V/I and I/V converter) of Op-Amp.	K2
CO 3	Explain various number systems and characteristics of digital logic families.	K3
CO 4	Explain the implementation of combinational circuit such as multiplexers and de-multiplexers - code converters, adders, subtractors, Encoders and Decoders.	K3
CO 5	Design various synchronous and asynchronous circuits using Flip Flops.	K4

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

Text Books	1. Morris Mano.M, 'Digital Logic and Computer Design', Prentice Hall of India, 3rdEdition, 2005. 2. Donald D.Givone, 'Digital Principles and Design', Tata McGraw Hill,1st Edition, 2003. 3. Thomas L Floyd, 'Digital fundamentals', Pearson Education Limited, 11th Edition, 2018. 4. David A. Bell, 'Op-amp & Linear ICs', Oxford, Third Edition, 2011. 5. D. Roy Choudhary, Sheil B. Jani, 'Linear Integrated Circuits', , New Age, Fourth Edition, 2018. 6. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, PHI 2021.

Reference Books	1. Tocci R.J., Neal S. Widmer, 'Digital Systems: Principles and Applications', Pearson Education Asia, 12th Edition, 2017. 2. Donald P Leach, Albert Paul Malvino, Goutam Sha, 'Digital Principles and Applications',Tata McGraw Hill, 7th Edition, 2010. 3. Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013. 4. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', McGraw Hill, 2nd Edition, 2017.

Tools for Assessment (40 Marks)

CIAI	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	-	-	-	-	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	PSO 1	PSO 2
CO1	1	1
CO2	1	1
CO3	1	1
CO4	1	1
CO5	1	1

Course designed by	Verified by

Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Edison prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE404	TRANSMISSION AND DISTRIBUTION					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Electric Circuit Analysis, Electromagnetic fields					

Course Objectives

1	To impart knowledge about the configuration of the electrical power systems.
2	To study the line parameters and interference with neighboring circuits.
3	To understand the mechanical design and performance analysis of transmission lines.
4	To learn about different insulators and underground cables.
5	To understand and analyze the distribution system.

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

Course Description: The course helps the students to develop the fundamentals and basic concepts in generation, transmission and distribution, performance analysis of transmission lines mechanical design and analyze of the different types of distribution system.

Course Content

Unit	Description	
I	**TRANSMISSION LINE PARAMETERS:** Structure of electric power system - Parameters of single and three phase transmission lines with single and double circuits -Resistance, inductance, and capacitance of solid, stranded, and bundled conductors - Typical configuration, conductor types - Symmetrical and unsymmetrical spacing and transposition – application of self and mutual GMD; skin and proximity effects - Effects of earth on the capacitance of the transmission line - interference with neighboring communication circuits.	
	Contact Periods	9
II	**MODELLING AND PERFORMANCE OF TRANSMISSION LINES:** Performance of Transmission lines – short line, medium line and long line – equivalent circuits, phasor diagram, attenuation constant, phase constant, surge impedance – transmission efficiency and voltage regulation, real and reactive power flow in lines – Power Circle diagrams – Ferranti effect – Formation of Corona – Critical Voltages – Effect on line Performance.	
	Contact Periods	9
III	**SAG CALCULATION AND LINE SUPPORTS:** Mechanical design of overhead lines – Line Supports –Types of towers – Tension and Sag Calculation for different weather conditions – Methods of grounding - Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.	
	Contact Periods	9

IV	**UNDERGROUND CABLES:** Underground cables – Types of cables – Construction of single-core and 3-core belted cables – Insulation Resistance – Potential Gradient – Capacitance of single-core and 3-core belted cables – Grading of cables – Power factor and heating of cables– DC cables.	
	Contact Periods	**9**
V	**DISTRIBUTION SYSTEMS:** Distribution Systems – General Aspects – Kelvin's Law – AC and DC distributions –Concentrated and Distributed loading- Techniques of Voltage Control and Power factor improvement – Distribution Loss – Types of Substations – Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only).	
	Contact Periods	**9**
	Total Periods	**45**

Course Outcomes

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

CO 1	Understand the structure of power system, computation of transmission line parameters for different configurations.	K2
CO 2	Model the transmission lines to determine the line performance and to understand the impact of Ferranti effect and corona on line performance.	K3
CO 3	Do Mechanical design of transmission lines, grounding and to understand about the insulators in transmission system.	K3
CO 4	Design the underground cables and understand the performance analysis of underground Cable.	K4
CO 5	Modeling and performance analysis and modern trends in different types of distribution system.	K4

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

Text Books	1. D.P.Kothari, I.J. Nagarath, 'Power System Engineering', Mc Graw-Hill Publishing Company limited, New Delhi, Third Edition, 2019. 2. C.L.Wadhwa, 'Electrical Power Systems', New Age International Ltd, seventh edition 2022. 3. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2008.
Reference Books	1. B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Sixth Edition, 2011. 2. Luces M.Fualken berry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 2007. 3. Arun Ingole, "Power transmission and distribution" Pearson Education, first edition, 2018. 4. J.Brian Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering', Newnes; Fourth Edition, 2011.

5. G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013.
6. V.K.Mehta, Rohit Mehta, 'Principles of power system', S. Chand & Company Ltd, New Delhi, 84 2013
7. Hadi Saadat, 'Power System Analysis', McGraw Hill Education Pvt. Ltd., New Delhi, 3rd Edition, 23rd reprint, 2015.
8. R.K.Rajput, 'A Text Book of Power System Engineering' 2nd edition, Laxmi Publications (P) Ltd, New Delhi, 2016

Tools for Assessment (40 Marks)

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

3-High; 2-Medium; 1-Low

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

Course designed by	Verified by

Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. k Edison prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Nehru Institute of Engineering & Technology Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE405	SYNCHRONOUS AND INDUCTION MACHINES					
Semester: IV	L	T	P	Credits	CIA: 40 Marks	ESE: 60 Marks
	3	0	0	3		
Course pre-requisites	Electromagnetic Fields, DC Machines and Transformers					

Course Objectives: To impart knowledge on the:

1	Construction and performance of salient and non – salient type synchronous generators.
2	Principle of operation and performance of synchronous motor.
3	Construction, principle of operation and performance of induction machines.
4	Starting and speed control of three-phase induction motors.
5	Construction, principle of operation and performance of single phase induction motors and special machines.

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

Course Description: The course helps the students to develop the fundamentals and basic concepts in AC machines, Construction and working principle of Induction machine, Synchronous machine and performance analysis of AC machines using fundamental laws.

Course Content

Unit	Description	
I	**SYNCHRONOUS GENERATOR:** Constructional details – Types of rotors –winding factors-EMF equation – Synchronous reactance – Armature reaction – Phasor diagrams of non-salient pole synchronous generator connected to infinite bus--Synchronizing and parallel operation – Synchronizing torque -Change of excitation and mechanical input- Voltage regulation – EMF, MMF, ZPF and A.S.A method – steady state powerangle characteristics– Two reaction theory –slip test -short circuit transients - Capability Curves.	
	Contact Periods	9
II	**SYNCHRONOUS MOTOR:** Principle of operation – Torque equation – Operation on infinite bus bars - V and Inverted V curves – Power input and power developed equations – Starting methods – Current loci for constant power input, constant excitation and constant power Developed-Hunting – natural frequency of oscillations – damper windings- synchronous condenser.	
	Contact Periods	9
III	**THREE PHASE INDUCTION MOTOR:** Constructional details – Types of rotors –- Principle of operation – Slip –cogging and crawlingEquivalent circuit – Torque-Slip characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram – Separation of losses – Double cage induction motors –Induction generators – Synchronous induction motor.	
	Contact Periods	9

IV	**STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR:** Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star delta starters – Speed control – Voltage control, Frequency control and pole changing – Cascaded Connection-V/f control – Slip power recovery Scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.	
	Contact Periods	9
V	**SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES:** Constructional details of single phase induction motor – Double field revolving theory and operation – Equivalent circuit – No load and blocked rotor test – Performance analysis – Starting methods of single-phase induction motors – Capacitor-start capacitor run Induction motor- Shaded pole induction motor - Linear induction motor – Repulsion motor - Hysteresis motor - AC series motor- Servo motors. BLDC Motors, Stepper motors - introduction to magnetic levitation systems.	
	Contact Periods	9
	Total Periods	45
Course Outcomes **Upon successful completion of the course, students will be able to:**		
CO 1	Ability to understand the construction and working principle of Synchronous generator.	K2
CO 2	Ability to understand the construction and working principle of Synchronous Motor.	K2
CO 3	Ability to understand the construction and working principle of Three Phase Induction Motor.	K2
CO 4	Acquire knowledge about the starting and speed control of induction motors.	K3
CO 5	To gain knowledge about the basic principles and working of Single phase induction motors and Special Electrical Machines.	K4
K1: Remembering; K2: Understanding; K3: Applying; K4: Analyzing; K5: Evaluating; K6: Creating		
Text Books	1. A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Mc Graw Hill publishing Company Ltd, 6th Education 2017. 2. Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw Hill Education Pvt. Ltd, 4th Edition 2017. 3. D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, 5th Edition 2017 4. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, edition 2, 2021.	

Reference Books	1. Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016. 2. M.N. Bandyopadhyay, Electrical Machines Theory and Practice, PHI Learning PVT LTD., New Delhi, 2011. 3. B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers.3rd Edition, Reprint 2015. 4. Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, First edition 2010. 5. Alexander S. Langsdorf, 'Theory of Alternating-Current Machinery', McGraw Hill Publications, 2001. MAPPIN.

Tools for Assessment (40 Marks)

CIAI	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	-	-	-	-	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	PSO 1	PSO 2
CO1	1	1
CO2	1	1
CO3	1	1

CO4	1	1
CO5	1	1

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

Course Code	Title					
U23EE406	MEASUREMENTS AND INSTRUMENTATION					
Semester: IV	L	T	P	Credits	CIA: 50 Marks	ESE: 50 Marks
	2	0	2	3		
Course pre-requisites	Electric Circuit Analysis, Electromagnetic fields					

Course Objectives

1	To educate the fundamental concepts and characteristics of measurement and errors
2	To impart the knowledge on the functional aspects of measuring instruments
3	To infer the importance of various bridge circuits used with measuring instruments.
4	To educate the fundamental working of sensors and transducers and their applications
5	To summarize the overall measurement and instrumentation with the knowledge on digital instrumentation principles.

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

Course Description: The course helps the students to develop the fundamentals and basic concepts in measurements and Instrumentation systems, transducers and digital instrumentation. Students will be able to solve problems related to bridge circuit analysis by using fundamental laws.

Course Content:

Unit	Description	
I	**CONCEPTS OF MEASUREMENTS:** Instruments: classification, applications – Elements of a generalized measurement system - Static and dynamic characteristics - Errors in measurement - Statistical evaluation of measurement data..	
	Contact Periods	6
II	**MEASUREMENT OF PARAMETERS IN ELECTRICAL SYSTEMS:** Classification of instruments – moving coil and moving iron meters – Induction type, dynamometer type watt meters – Energy meter – Megger – Instrument transformers (CT & PT)	
	Contact Periods	6
III	**AC/DC BRIDGES AND INSTRUMENTATION AMPLIFIERS:** Wheatstone bridge, Kelvin double bridge - Maxwell, Hay, Wien and Schering bridges – Errors and compensation in A.C. bridges - Instrumentation Amplifiers.	
	Contact Periods	6

IV	**TRANSDUCERS FOR MEASUREMENT OF NON- ELECTRICAL PARAMETERS:** Classification of transducers – Measurement of pressure, temperature, displacement, flow, angular velocity – Digital transducers – Smart Sensors.	
	Contact Periods	6
V	**DIGITAL INSTRUMENTATION:** A/D converters: types and characteristics – Sampling, Errors- Measurement of voltage, Current, frequency and phase - D/A converters: types and characteristics- DSO- Data Loggers – Basics of PLC programming and Introduction to Virtual Instrumentation - Instrument standards.	
	Contact Periods	6
	Total Periods	30

LIST OF EXPERIMENTS

1. Bridge Networks –AC and DC Bridges
2. Dynamics of Sensors/Transducers:
   (a) Temperature (b) pressure (c) Displacement (d) Flow
3. Signal Conditioning: (a) Instrumentation Amplifier
4. Signal Conditioning: Analog – Digital Converter
5. Digital –Analog converters
6. Mathematical modeling and simulation of physical systems in at least two fields. (Mechanical and Electrical).

Total Periods 30

Course Outcomes

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

CO 1	Ability to understand the fundamental art of measurement in engineering.	K2
CO 2	Ability to understand the structural elements of various instruments.	K2
CO 3	Ability to understand the importance of bridge circuits.	K3
CO 4	Ability to understand about various transducers and their characteristics by experiments.	K2
CO 5	Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.	K2

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

Text Books	1. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements. & Instrumentation', Dhanpat Rai and Co, New Delhi, Edition 2011. 2. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010.

Reference Books	1. M.M.S. Anand, 'Electronics Instruments and Instrumentation Technology', Prentice Hall India, New Delhi, 2009. 2. J.J. Carr, 'Elements of Electronic Instrumentation and Measurement', Pearson Education India, New Delhi, 2011. 3.W.Bolton, Programmable Logic Controllers, 6th Edition, Elseiver, 2015. 4. R.B. Northrop, 'Introduction to Instrumentation and Measurements', Taylor & Francis, New Delhi, 3rd Edition 2014. 5. E. O. Doebelin and D. N. Manik, "Measurement Systems – Application and Design", Tata McGraw-Hill, New Delhi, 6th Edition 2017. 6. R. K. Rajput, "Electrical and Electronics Measurements and Instrumentation", Chand Pub, 2016.

Tools for Assessment - Theory

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

Tools for Assessment– Practical

Model Exam I	Model Exam I	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	-	-	1
CO2	3	3	2	1	1	-	-	-	1	-	-	1
CO3	3	3	2	1	1	-	-	-	1	-	-	1
CO4	3	3	2	1	1	-	-	-	1	-	-	1
CO5	3	3	2	1	1	-	-	-	1	-	-	1

3-High; 2-Medium; 1-Low

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

CO4	1	1
CO5	1	1

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Edison prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE417	LINEAR AND DIGITAL LOGIC CIRCUITS LABORATORY					
Semester: IV	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	Electronic Devices and Circuits					

Course Objectives

1	To learn design, testing and characterizing of circuit behavior with combinational logic gate ICs.
2	To learn design, testing and characterizing of circuit behavior with register/ counter and sequential logic ICs.
3	To learn design, testing and characterizing of circuit behavior with OPAMP ICs.
4	To learn design, testing and characterizing of circuit behavior with analog Ics like 555 timer VCO and regulators.
5	To learn design, testing and characterizing of circuit behavior with digital Ics like decoders, multiplexers.

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

Course Description: The course helps the students to develop the fundamentals and basic concepts in design and implementation of linear and digital IC's circuits. Students will be able to solve problems related to digital circuits by using combinational and sequential logic circuits.

Course Content:

LIST OF EXPERIMENTS

1. Implementation of Boolean Functions, Adder and Subtractor circuits.
2. Code converters: Excess-3 to BCD and Binary to Gray code converter and vice-versa.
3. Parity generator and parity checking.
4. Encoders and Decoders.
5. Counters: Design and implementation of 3-bit modulo counters as synchronous and Asynchronous types using FF IC's and specific counter IC.
6. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitability ICs.
7. Study of multiplexer and de multiplexer.
8. Timer IC application: Study of NE/SE 555 timer in Astability, Monostability operation.
9. Application of Op-Amp: inverting and non-inverting amplifier, Adder, comparator, Integrator and Differentiator.
10. Voltage to frequency characteristics of NE/ SE 566 IC.
11. Variability Voltage Regulator using IC LM317.

Total Periods 30

Course Outcomes

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

CO 1	Understand and implement Boolean Functions.	K3
CO 2	Understand the importance of code conversion	K2

CO 3	Design and implement circuits with digital ICs like decoders, multiplexers, register.	K4
CO 4	Acquire knowledge on Application of Op-Amp	K2
CO 5	Design and implement counters using analog ICs like timers, VCOs and digital ICs like Flip-flops and counters.	K4

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

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculation & 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	2	-	-	-	-	-	1	-	-	1
CO2	3	3	2	-	-	-	-	-	1	-	-	1
CO3	3	3	2	-	-	-	-	-	1	-	-	1
CO4	3	3	2	-	-	-	-	-	1	-	-	1
CO5	3	3	2	-	-	-	-	-	1	-	-	1

3-High; 2-Medium; 1-Low

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

Course designed by	Verified by
Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Edison Prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR Department of Electrical & Electronics Engineering Nehru Institute of Engineering & Technology Name and Seal of the Chairperson-BoS

Course Code	Title					
U23EE418	SYNCHRONOUS AND INDUCTION MACHINES LABORATORY					
Semester: IV	L	T	P	Credits	CIA: 60 Marks	ESE: 40 Marks
	0	0	2	1		
Course pre-requisites	Electromagnetic fields, DC Machines and Transformers Laboratory					

Course Objectives

1	To expose the students to the operation of synchronous motors and give them experimental skill.
2	To expose the students to the operation of synchronous generators and give them experimental skill.
3	To expose the students to the operation of separation of no load losses.
4	To expose the students to the operation of Single phase induction motors and gives them experimental skill.
5	To expose the students to the operation of three phase induction motors and gives them experimental skill.

Course Category	Professional Core Course (PCC)

Course Content: The course helps the students to develop the fundamentals and basic concepts in AC machines, Construction and working principle of induction machine, synchronous machine and performance analysis of machines.

LIST OF EXPERIMENTS

1. Regulation of three phase alternator by EMF and MMF methods.
2. Regulation of three phase alternator by ZPF and ASA methods.
3. Regulation of three phase salient pole alternator by slip test.
4. Measurements of negative sequence and zero sequence impedance of alternators.
5. V and Inverted V curves of Three Phase Synchronous Motor.
6. Load test on three-phase induction motor.
7. No load and blocked rotor tests on three-phase induction motor (Determination of equivalent circuit parameters).
8. Separation of No-load losses of three-phase induction motor.
9. Load test on single-phase induction motor.
10. No load and blocked rotor test on single-phase induction motor.
11. Study of Induction Motor Starters

Total Periods 30

Course Outcomes

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

CO 1	Understand and analyze EMF and MMF methods	K4
CO 2	Analyze the characteristics of V and Inverted V curves	K4
CO 3	Acquire hands on experience of conducting various tests on alternators and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of Synchronous machines	K2

CO 4	Acquire hands on experience of conducting various tests on induction motors and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of single and three phase Induction motors	K3
CO 5	Acquire knowledge on separation of losses	K2

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

Tools for Assessment (40 Marks)

Preparation	Conduct of Experiments	Calculation & 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	2	-	-	-	-	-	1	-	-	1
CO2	3	3	2	-	-	-	-	-	1	-	-	1
CO3	3	3	2	-	-	-	-	-	1	-	-	1
CO4	3	3	2	-	-	-	-	-	1	-	-	1
CO5	3	3	2	-	-	-	-	-	1	-	-	1

3-High; 2-Medium; 1-Low

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

Course designed by	Verified by

Signature of the Faculty Member	Signature of the Chairperson-BoS
Dr. K. Edison Prabhu AP/EEE Name and Department of the Faculty Member	Dr.R.KANNAN PROFESSOR & HEAD Department of Electrical & Electronics Engineering Nehru Institute of Engineering & Technology Name and Seal of the Chairperson-BoS