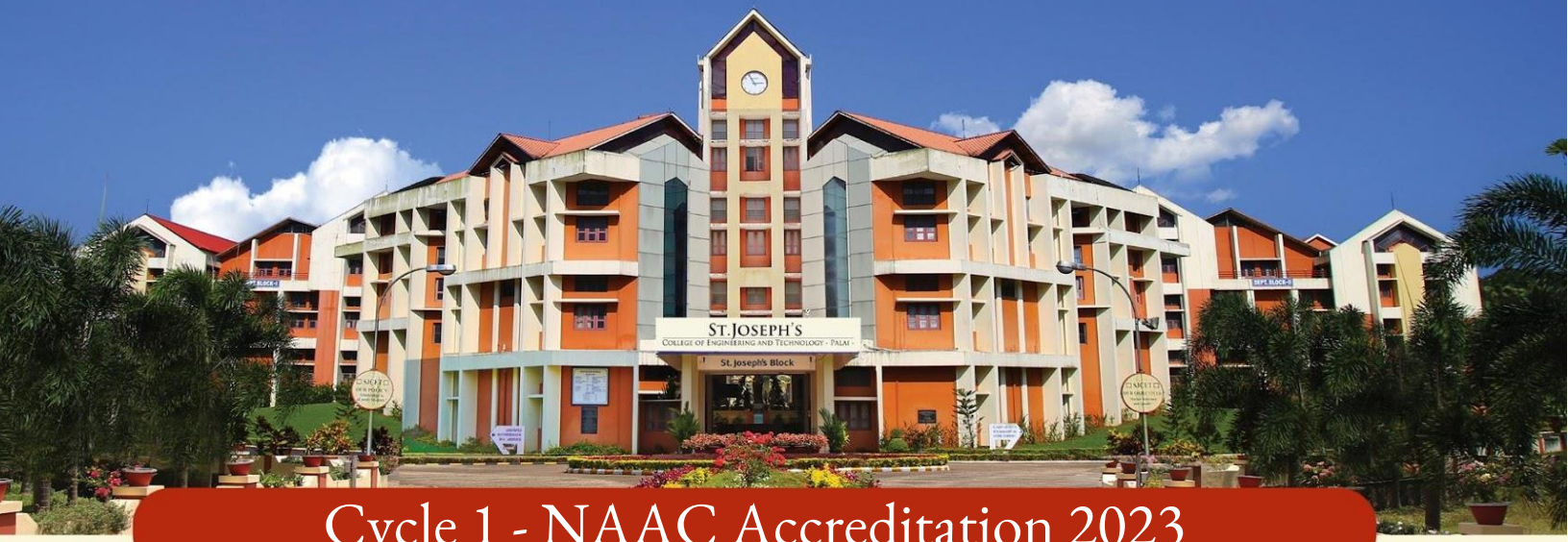
ST. JOSEPH'S
COLLEGE OF ENGINEERING AND TECHNOLOGY, - PALAI -

Choondacherry P.O., Palai, Kottayam Pin 686579, Kerala,India
Phone: +91 4822-239700, 239301, 239302
Email: info@sjcetpalai.ac.in • Website: www.sjcetpalai.ac.in



Cycle 1 - NAAC Accreditation 2023

Criterion – 2

2.6 Student Performance and Learning Outcome

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated

Submitted to:

National Assessment and Accreditation Council

Signed By:Devassia V P
Date:14.09.2023 19:21

Criterion – 2

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution are stated and displayed on website and attainment of POs and COs are evaluated

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

CONTENTS

1

MAT 101	LINEAR ALGEBRA AND CALCULUS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Prerequisite: A basic course in one-variable calculus and matrix theory.

Course Outcomes: After completion of the course the student will be able to:

CO 1	Solve systems of linear equations, diagonalize matrices and characterize quadraticforms
CO2	Compute the partial and total derivatives and maxima and minima of multivariable functions.
CO3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and center of gravity of plane laminas
CO4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
CO5	Determine the Taylor and Fourier series expansion of functions and learn their applications.

Mapping of course outcomes with program outcomes (Minimum requirement):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-
CO2	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-
CO3	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-
CO4	3	2	3	2	1	1	-	-	1	2	-	2	1	-	-
CO5	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-
Avg	3	2.8	3	2.8	1.8	1	-	-	1	2	-	2	1.6	-	-

Signed By:Devassia V P
Date:14.09.2023 19:21

Justification for CO-PO Mapping:

CO	PO	LEVEL	REMARK S
CO1	**PO 1**	3	By understanding the concept of matrix theory, the students will beable to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the fundamental concept of matrix, the studentswill be able to identify, formulate and analyze simple engineering problems.
	PO 3	3	By understanding the fundamental concept of diagonalization of matrices and quadratic forms the helps the student in lifelong learning in the context of technology change.
	PO4	3	By understanding the fundamental concept of matrix theory, the students will be able to do analysis and interpretation of data
	PO5	2	By understanding the fundamental concept of linear equationsand matrix theory the students will be able to apply appropriate techniques in complex engineering activities.
	PO6	1	The knowledge of fundamental concept of matrix theory help to communicate effectively on complex engineering activities with the engineering community and with society at large.
	PO9	1	By understanding the concept of matrix theory, the students will beable to engage in continuous learning.
	PO10	2	Understanding matrices helps students for writing effective reports.
	PO12	2	The matrix theory concepts help students to adapt emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
	PSO1	1	The matrix theory concepts help students to apply fundamental knowledge in Electronics and Computer Engineering to analyse and design hardware and software systems so as to understand and solve engineering problems. .

Signed By:Devassia V P
Date:14.09.2023 19:21

CO2	**PO 1**	3	By understanding the fundamental concept of differential calculus of functions the students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the fundamental concept of differential calculus of functions the students will be able to apply the knowledge for analysis and interpretation of data.
	PO3	3	By understanding multivariable calculus, the students will be able to model and study high dimensional systems.
	PO4	3	By understanding the multivariable calculus and differential equations the students will be able to explain natural phenomenon in good manner.
	PO5	2	By understanding the modern multivariable calculus, the students will be able to apply appropriate techniques in complex engineering activities.
	PO6	1	By understanding the concept of differential equations, the students will be able to engage in continuous learning.
	PO9	1	The knowledge of fundamental concept of differential equation help to communicate effectively on complex engineering activities
	PO10	2	The concept of multivariable calculus helps students to adapt emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
	PO12	2	The knowledge of multi variable calculus and differential equations help in designing solutions to complex problems
	PSO1	1	Apply knowledge of mathematics, science and engineering to design commission and maintain various type of electrical systems and address challenges in the field

Signed By:Devassia V P
Date:14.09.2023 19:21

CO3	**PO 1**	3	By understanding the fundamental concept of multiple integrals can be used to create mathematical models in order to arrive into an optimal solution.
	PO 2	3	By understanding the fundamental concept of multiple integrals, the students will be able to apply the knowledge for analysis and interpretation of data.
	PO 3	3	By understanding the concept of the double integrals helps in designing solutions for engineering problems
	PO 4	3	The knowledge of double integrals concepts helps the student in lifelong learning in the context of technology change.
	PO 5	2	By understanding the concept of integration can be used to create and apply appropriate techniques in solving engineering problems.
	PO 6	1	By understanding the concept of integration, the students will be able to engage in continuous learning
	PO9	1	The knowledge of fundamental concept of integration helps to communicate effectively on complex engineering activities
	PO10	2	Understanding integration helps students for writing effective reports.
	PO12	2	The concept of double integration helps students to adapt emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
	PSO1	1	Apply knowledge of mathematics , science and engineering to design commission and maintain various type of electrical systems and address challenges in the field

Signed By:Devassia V P
Date:14.09.2023 19:21

CO4	**PO 2**	2	By understanding infinite series, the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	3	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to design solutions for simple engineering problems.
	PO4	2	The knowledge of infinite series provides technique for solving simple engineering problems.
	PO 5	1	The knowledge of fundamental concept of infinite series helps to communicate effectively on complex engineering activities
	PO 6	1	By understanding various tests can be applied to assess societal, legal and cultural issues.
	PO 9	1	By understanding infinite series, the student will be able to engage in continuous learning.
	PO10	2	Understanding infinite series helps students for writing effective reports.
	PO12	2	By understanding the concept of infinite series will enable students to engage in lifelong learning.
	PSO1	1	Apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field
CO5	**PO 1**	3	By understanding the concept of Taylor series provides different techniques in solving engineering problems.
	PO 2	3	By understanding the fundamental concept of Taylor series the students will be able to apply the knowledge for analysis and interpretation of data.
	PO 3	3	By understanding the concept of Fourier series, the students will be able to design system components.
	PO 4	3	By understanding the concept of series helps the students to draw valid conclusions from the data
	PO 5	2	Understanding the concept of series can be used to create and apply appropriate techniques in solving engineering problems.
	PO 6	1	By understanding the concept of series make students to prepare fective reports and to make effective presentation
	PO 9	1	By understanding the concept of Fourier series, the students will able to engage in continuous learning
	PO10	2	dern techniques are used in understanding the problems n the society

Signed By:Devassia V P
Date:14.09.2023 19:21

	PO12	2	By understanding the concept of Fourier series, the students will be able to cop- up with the technology change
	PSO1	1	Apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field

Signed By:Devassia V P
Date:14.09.2023 19:21

EST 110	ENGINEERING GRAPHICS	L	T	P	CREDIT	Year of Introduction
		2	0	2	3	2019

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
EST 110.1	CO1: Draw the projection of points and lines located in different quadrants	**K3**
EST 110.2	CO2: Prepare multiview orthographic projections of objects by visualizing them indifferent positions	**K3**
EST 110.3	CO3: Draw sectional views and develop surfaces of a given object	**K3**
EST 110.4	CO4: Prepare pictorial drawings using the principles of isometric and perspectiveprojections to visualize objects in three dimensions.	**K3**
EST 110.5	CO5: Convert 3D views to orthographic views	**K3**
EST 110.6	CO6**:** Obtain multiview projections and solid models of objects using CAD tools	**K3**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EST 110.1	3	-	-	-	-	-	-	-	-	-	-	-	3	0
EST 110.2	3	-	-	-	-	-	-	-	-	-	-	-	3	0
EST 110.3	3	1	-	-	-	-	-	-	-	-	-	-	3	0
EST 110.4	3	-	-	-	-	-	-	-	-	1	-	-	3	0
EST 110.5	3	-	-	-	-	-	-	-	-	2	-	-	3	0

Signed By:Devassia V P
Date:14.09.2023 19:21

EST 110.6	3	-	-	-	3	-	-	-	-	3	-	-	3	0
EST 110	3	1	-	-	3	-	-	-	-	2	-	-	3	0

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Graduates are able to apply Engineering fundamentals related to 2D orthographic projection of lines to develop Engineering drawings related to complex design problems.
CO2-PO1	3	Graduates are able to apply Engineering fundamentals related to 2D orthographic projection of solids to develop Engineering drawings related to complex design problems.
CO3- PO1	3	Graduate will be able to apply the concept of section to describe the concealed features of parts designed as a part of solution to Engineering problems.
CO3 –PO2	1	Graduate will be able to analysis and infer 3 Dimensional Models related to complex problems.
CO4 – PO1	3	Graduate will be able to apply knowledge related to isometric projection to develop 3 Dimensional models as a part of solution related to design problems.
CO4 – PO10	1	Graduate will be able to convey solutions for complex engineering problems in a better way using 3 dimensional models developed using the concept of perspective projection and isometric projection.
CO5 – PO1	3	Graduate will be convert 3 Dimensional models to 2 dimensional orthographic views for simplified solutions for design problems
CO5 – PO10	2	Graduate will be able to use simplified orthogonal views to describe delicate and complex features of a 3 Dimensional models.
CO6 - PO1	3	Usage of CAD software package will help graduates apply the Engineering knowledge related to orthographic projection to 2 Dimensional drawing sand 3 Dimensional models as a part of solutions to complex problems.
CO6-PO5	3	Use of Cad Software helps graduate to become familiar with the usage of modern IT tools for modeling solutions of complex Engineering Problems.
CO6-PO10	3	The exploded views of 3D models developed using a Cad software helps graduate to effectively convey order of assembly of different parts.
CO1 -PSO1 CO2 –PSO1 CO3-PSO1 CO4-PSO1 CO5-PSO1 CO6-PSO1	3	Graduates are able to understand how to apply orthographic projection of lines, simple solids, isometric projection of solids, 2D &3D drawings of CAD software packages, sections, developments and perspective projection of simple solids etc for for design various types of electrical systems.

Signed By:Devassia V P
Date:14.09.2023 19:21

CYT 100	ENGINEERING CHEMISTRY	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Course outcomes: After the completion of the course the students will be able to

CO 1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
CO 2	Understand various spectroscopic techniques like UV-Visible, IR, and NMR and theirapplications.
CO 3	Apply the knowledge of the analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterization of nanomaterials.
CO 4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
CO 5	Study various types of water treatment methods to develop skills for treating wastewater.

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	1	-	1	2	-	-	-	-	-	-	-	1	-	-
CO3	1	1	-	1	2	-	-	-	-	-	-	-	1	1	-
CO4	2	1	-		-	-	-	-	-	-	-	-	1	1	-

Signed By:Devassia V P
Date:14.09.2023 19:21

CO5	1	-	-	1	-	-	3	-	-	-	-	-	1	-	-
Avg.	1.2	1.25	1	1	2	-	3	-	-	-	-	-	1	1	-

CO	**PO**	**LEVEL**	**REMARKS**
CO1	**PO1**	1	Information gathered on electrochemistry and corrosion can be used to elucidate variousEngineering problems
	PO2	2	Understanding the basic principles of electrochemistry and corrosion help to assess recentresearch literature and also to scrutinize the issues related to the area of electrochemical engineering.
	PO3	1	Knowledge on the Electrochemical basis of corrosion and its prevention method can be utilized insolving problems related to material corrosion and also help to design various energy storage

Signed By:Devassia V P
Date:14.09.2023 19:21

			systems.
CO2	**PO1**	1	Knowledge on spectrochemical techniques helps to find solutions to engineering problems likestructure analysis of materials
	PO2	1	Understanding the basic concepts of spectroscopic techniques can be utilized for the analysis ofthe structural identification of the materials of importance
	PO4	1	Information acquired on the structural identification of compounds can be used to performstudies to solve complex problems
	PO5	2	Spectroscopy can use as a modern tool for the prediction and design of materials havingapplications in the field of modern engineering materials
	PSO1	1	The spectroscopic techniques can be used as a method for the prediction, structural elucidation,designing and synthesizing of modern engineering materials
CO3	**PO1**	1	Understanding the basic principle of chromatography and thermal characterization techniquescan be used to solve problems related to these fields in engineering stream
	PO2	1	Analytical techniques help to design and select resources for various engineering activities.
	PO4	1	Research based on thermoanalytical technique such as TGA, DTA and SEM etc. helps to designand reinforce the properties of engineering polymers
	PO5	2	Knowledge on updated analytical techniques provide an effective route for the prediction andimplementation of complex engineering accomplishments
	PSO1	1	The analytical techniques can be used as a device for the forecast, design and enactment ofmodern engineering materials

Signed By:Devassia V P
Date:14.09.2023 19:21

	PSO2	1	Information on basic theories of chromatography and thermal analysis utilized for determiningmaterials properties, transformations, characterizations and finally designing of them
CO4	**PO1**	2	Solve engineering problems by applying the knowledge on engineering materials like polymersand stereochemistry.
	PO2	1	Stereochemical study of engineering materials used to identify materials for engineeringconstructions and modeling.
	PSO1	1	By learning stereochemistry and polymers the students will be able to get a practice to work withmedicinal industry.
	PSO2	1	In construction field knowledge on advanced polymers are needful.
CO5	**PO1**	1	Knowledge on water treatment methods can be used to solve environmental related problems
	PO4	1	By utilizing the principles of water treatment methods students will be able to design novel watertreatment plants.
	PO7	3	Knowledge on various water treatment methods can be utilized for the sustainabledevelopment based on societal, health and environmental context.
	PSO1	1	Knowledge on water treatment methods can be used for waste water treatment as a sustainablesolution for environmental protection.

Signed By:Devassia V P
Date:14.09.2023 19:21

HUN 101	LIFE SKILLS	L	T	P	CREDIT	Year of Introduction
		2	0	2		2019

Course Outcomes

After the completion of the course the student will be able to:

CO 1	Define and Identify different life skills required in personal and professional life
CO 2	Develop an awareness of the self and apply well-defined techniques to cope with emotionsand stress.
CO 3	Explain the basic mechanics of effective communication and demonstrate these throughpresentations.
CO 4	Take part in group discussions
CO 5	Use appropriate thinking and problem solving techniques to solve new problems
CO 6	Understand the basics of teamwork and leadership

CO-PO-PSO Mapping

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
1	-	-	-	-	-	2	-	1	2	2	1	3	-	-	-
2	-	-	-	-	-	-	-	-	3	-	-	2	-	-	-
3	-	-	-	-	-	1	-	-	1	3	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	3	-	1	-	-	-
5	-	3	2	1	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	1	-	-	3	-	-	-	-	-	-

Signed By:Devassia V P
Date:14.09.2023 19:21

CO – PO – PSO Mapping Justification

CO	PO	MAPPING	JUSTIFICATION
CO 1	PO6	2	Graduate Need to apply the contextual knowledge to assess different life skillsrequired in personal and professional life
	PO8	1	Graduates Need to apply professional ethics and responsibilities in life skillsadopted in their personal and professional life
	PO9	2	Graduate Need to act effectively as an individual, or as a member or leader ina group for adopting different life skills.
	PO10	2	Graduates Need to communicate effectively with others to identify differentlife skills required in their personal and professional life
	PO11	1	Graduates Need to manage projects in multi-disciplinary environments usingtheir life skills.
	PO12	3	Graduate Need to identify the need for, and have the preparation and abilityto engage in independent and life-long learning in the broadest context of technological change using different life skills.
CO 2	PO9	3	Graduate Need to act effectively as an individual, or as a member or leader ina group for awareness of the self and apply well-defined techniques to cope with emotions and stress.
	PO12	2	Graduate Need to identify the need for, and have the preparation and abilityto engage in independent and life-long learning in the broadest context of well-defined techniques to cope with emotions and stress.
CO 3	PO6	1	Graduate Need to apply the contextual knowledge to assess effectivecommunication and demonstrate these through presentations.
	PO9	1	Graduate Need to act effectively as an individual, or as a member or leader ina group for adopting effective communication through presentations
	PO10	3	Graduates Need to communicate effectively with others and demonstrate these through different presentations
	PO10	3	Graduates Need to communicate effectively with others to improve their skillsduring group discussions and debates

Signed By:Devassia V P
Date:14.09.2023 19:21

CO 4	**PO12**	1	Graduate Need to identify the need for, and have the preparation and abilityto engage in independent and life-long learning in the broadest context of well-defined techniques for excelling in group discussions and debates.
CO 5	**PO2**	3	Graduate Need to Identify and formulate appropriate thinking and problemsolving techniques to resolve new problems.
	PO3	2	Graduate Need to design solutions for complex engineering problems anddesign system components or processes for the public with the cultural, societal and environmental considerations.
	PO4	1	Graduate Need to conduct investigations, analysis, interpretation of data, andsynthesis of the information for formulating different problem solving techniques
CO 6	**PO6**	1	Graduate Need to apply the contextual knowledge to assess differenttechniques for effective teamwork and leadership
	PO9	3	Graduate Need to act effectively as an individual, or as a member or leader ina team for a better display of leadership qualities.

EST 120	BASICS OF CIVIL AND MECHANICAL ENGINEERING	L	T	P	CREDIT	Year of Introduction
		4	0	0	4	2019

Pre-requisite: NIL

Course Outcome: After the successful completion of this course, the student will be able to:

EST120.1	Recall the role of civil engineer in society and to relate the various disciplines of civil engineering
EST 120.2	Explain different types of buildings, building components, building materials and building construction
EST 120.3	Describe the importance, objectives and principles of surveying
EST 120.4	Summarize the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
EST 120.5	Discuss the materials, energy systems, water management and environment for green buildings
EST 120.6	Analyse thermodynamic cycles and calculate its efficiency
EST 120.7	Illustrate the working and features of IC Engines.
EST 120.8	Explain the basic principles of Refrigeration and Air Conditioning.
EST 120.9	Describe the working of hydraulic machines
EST 120.10	Explain the working of power transmission elements.
EST 120.11	Describe the basic manufacturing, metal joining and machining processes

CO-PO matrices of courses selected

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EST120.1	3	-	-	12	-	3	2	2	-	-	-	-	-	-
EST120.2	3	2	-	1	3	-	-	3	-	-	-	-	-	-
EST120.3	3	2	-	-	3	-	-	-	2	-	-	-	-	-
EST120.4	3	2	-	-	3	-	-	-	2	-	-	-	-	-
EST120.5	3	2	-	-	3	2	3	-	2	-	-	-	-	-
EST120.6	3	2	-	-	-	-	-	-	-	-	-	-	-	-
EST120.7	3	1	-	-	-	-	-	-	-	-	-	-	-	-
EST120.8	3	1	-	-	-	-	-	-	-	-	-	-	-	-
EST120.9	3	2	-	-	-	-	-	-	-	-	-	-	-	-
EST120.10	3	1	-	-	-	-	-	-	-	-	-	-	-	-
EST120.11	3	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG.	**3**	**1.67**	**-**	**1**	**3**	**2.5**	**2.5**	**2.5**	**2**	**-**	**-**	**-**	**-**	**1**

JUSTIFICATION FOR CO-PO MAPPING:

CO	PO	LEVEL	REMARKS
EST120.1	PO1	3	Students will be able to know the role of a civil engineer in a society and understand the various fields of civil engineering such as structural, transportation, water resources, environmental engineering
	PO6	3	Students will be able to apply their knowledge to the society with respect to certain standards
	PO7	2	Students will be able to consider environmental impacts for a sustainable development
	PO8	2	Students can apply professional ethics and standards in the field of civil engineering
EST120.2	PO1	3	Students will be able to know the various types of buildings, components, materials and construction methods
	PO2	2	Students will be able to analyse engineering problems related to buildings, components, materials and construction methods
	PO4	1	Students will be able to carry research/ field studies, experimental analysis on various types of buildings and its components
			Students will be able to apply appropriate techniques, modern technologies
	PO5	3	with the support of IT in designing, planning and implementation of a building project
	PO8	3	Students can apply professional ethics and mandatory standards in all phases of a civil engineering project to ensure the compliance on quality
EST120.3	PO1	3	Students will be able to know the various importance and objectives of surveying for a civil engineering project
	PO2	2	Students will be able to do preliminary survey in prior to the implementation of a civil engineering project
	PO5	3	Students will be able to apply appropriate techniques (Total station, Dumpy level), modern technologies with the support of IT, GIS, GPS platforms for surveying
	PO9	2	Students can adopt a participatory approach with good teamwork for effective surveying to minimize the errors

	PO 1	3	Students will be able to apply the basic engineering knowledge to select infrastructure services, HVAC, elevators, escalators and ramps
EST120.4	**PO 2**	2	Students will be able to analyse the need, location and implementation of infrastructure services, HVAC, elevators, escalators and ramps in a building
	PO 5	3	Students will be able to apply appropriate techniques, modern technologies with the support of IT for all indoor and outdoor infrastructure services
	PO 9	2	Students can adopt a participatory approach for the planning and selection of basic infrastructure services
EST120.5	**PO 1**	3	Students will be able to apply the basic engineering knowledge to design a green building by considering social, environmental aspects
	PO 2	2	Students will be able to analyse the importance of green building concept to conserve energy, water etc.
	PO 5	3	Students will be able to apply appropriate techniques, modern technologies with the support of IT for energy and water management aspects of greenbuilding
	PO 6	2	Students will be able to contribute the concept of green building, energyconservation, water conservation and apply their knowledge to the society with respect to certain standards
	PO 7	3	Students will be able to consider environmental benefits for a sustainable development with respect to green building concept
	PO 9	2	Students can adopt a participatory approach to give awareness on green buildings, energy conservation and water management practices
EST120.6	**PO 1**	3	Graduates can apply engineering fundamentals related to thermodynamics to understand the thermodynamics problems
	PO 2	2	Graduates can identify the different thermodynamic devices based on thermodynamic laws
EST120.7	**PO 1**	3	Graduates able to apply engineering fundamentals to understand the classification of engines and distinguish them based on their respective working principles
	PO2	1	Graduate will be able to identify the constraints associated with effectiveness of different engines
EST120.8	**PO 1**	3	Graduate will be able to apply the engineering fundamentals to explain the type of refrigeration process and evaluate them based on their applications

	PO2	1	Graduate will be able to identify the thermodynamic applications specific to provide comfort conditions to industries and humans
EST120.9	**PO1**	3	Graduate will be able to apply the engineering fundamentals to explain working of hydraulic machines
	PO2	2	Graduate will be able to identify the hydraulic applications specific to industries and small scale .
EST120.10	**PO1**	3	Graduate will be able to apply the engineering fundamentals to explain different power transmission devices.
	PO2	1	Graduates can identify the different power transmission devices based on application.
EST120.11	**PO1**	3	Graduates will be able to interpret the application of different manufacturing processes used in the engineering field.

ESL 120	CIVIL WORKSHOP	L	T	P	CREDIT	Year of Introduction
		0	0	2	1	2019

Pre-requisite:

Course Outcome: After the successful completion of this course, the student will be able to:

ESL120. 1	Name different devices and tools used for civil engineeringmeasurements	K2
ESL120. 2	Explain the use of various tools and devices for various fieldmeasurements	K2
ESL120. 3	Demonstrate the steps involved in basic civil engineering activitieslike plot measurement, setting out operation, evaluating the natural profile ofland, plumbing and undertaking simple construction work.	K2
ESL120. 4	Choose materials and methods required for basic civil engineeringactivities like field measurements, masonry work and plumbing.	K2
ESL120. 5	Compare different techniques and devices used in civil engineeringmeasurements	K2

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ESL120. 1	1	-	-	-	1	1	-	-	2	2	-	-	-	-
ESL120. 2	1	-	-	-	1	1	-	-	2	2	-	-	-	-
ESL120. 3	1	-	-	-	1	1	-	2	2	2	-	-	-	-
ESL120. 4	1	-	-	-	1	1	-	2	2	2	-	-	-	-
ESL120. 5	1	-	-	-	1	1	-	-	2	2	-	-	-	-
ESL120	**1**				**1**	**1**		**2**	**2**	**2**			-	-

ESL120.1	**PO1**	1	Enumerate the various tools and devices used in Civil Engineering measurements
	PO5	1	Understand the advanced surveying equipment used in Civil Engineering
	PO6	1	Define the various civil engineering tools and equipment used in real-life construction practices.
	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
ESL120.2	**PO1**	1	Enumerate the various tools and devices used in Civil Engineering measurements
	PO5	1	Understand the advanced surveying equipment used in Civil Engineering
	PO6	1	Apply the comprehension of civil engineering tools and equipment in real-life construction practices.
	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
ESL120.3	**PO1**	1	Understand the steps involved in various Civil Engineering practices
	PO5	1	Operate various civil engineering tools used in basic civil engineering activities like setting out.
	PO6	1	Apply the knowledge of basic civil engineering in real-life construction practices
	PO8	2	Apply ethical principles in the Construction field activities by following the building construction norms and regulations.
	PO9	2	Work effectively as individual or team while carrying out basic civil engineering experiments
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
ESL120.4	**PO1**	1	Understand the various materials and methods used in Construction practices

Signed By:Devassia V P
Date:14.09.2023 19:21

	PO5	1	Apply the most appropriate construction practices and desired tools for basic civil engineering activities.
	PO6	1	Apply the comprehension of civil engineering tools and methods in real-life construction practices.
	PO8	2	Apply ethical principles in the Construction field activities by following the building construction norms and regulations.
	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
ESL 120.5	**PO1**	1	Understand the various materials and methods used in Construction practices
	PO5	1	Compare the various construction practices and tools used in basic civil engineering activities.
	PO6	1	Apply the best civil engineering tools and methods in real-life construction practices.
	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.

ESL 120	MECHANICAL ENGINEERING WORKSHOP	L	T	P	CREDIT	Year of Introduction
		0	0	2	1	2019

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
6	Identify Basic Mechanical workshop operations in accordance with the material andobjects	K1
7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades	K2
8	Apply appropriate safety measures with respect to the mechanical workshop trades	K3

CO – PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
6	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO6 – PO1	2	Graduates are able to identify and select mechanical tools for engineering problems by applying fundamentals in material science. andengineering.
CO7 – PO1	2	Graduates will be able to identify the tools for each function and can cater to the needs of other individuals and bring out collective results.
CO8-PO1	2	Graduates will be able to communicate with industry, society and other technical areas with proper nomenclature and dimensions

Signed By:Devassia V P
Date:14.09.2023 19:21

CYL 120	ENGINEERING CHEMISTRY LAB	L	T	P	CREDIT	Year of Introduction
		0	0	2	1	2019

Course outcomes: After the completion of the course the students will be able to

CO 1	Understand and practice different techniques of quantitative chemical analysis to generateexperimental skills and apply these skills to various analyses.
CO 2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for theidentification of drugs
CO 3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysingand interpreting the IR spectra and NMR spectra of some organic compounds.
CO 4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis.
CO 5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
CO 6	Function as a member of team, communicate effectively and engage in future learning. Also understand how chemistry addresses social, economical, and environmental problems and why it is an integral part of curriculum.

Mapping of course outcomes with program outcomes

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

Justification for CO-PO Mapping

CO	PO	LEVEL	REMARKS
CO1	PO1	3	Basic knowledge on quantitative chemical analysis is very useful for the successful conduct oftechnical works related to engineering chemistry
	PO5	2	A deep understanding of quantitative chemistry will help the engineering graduate to addressthe quantification of chemical errors in diverse engineering fields
	PO12	3	Student will be able to apply the basic quantitative chemical analysis techniques in variousstudies.
	PSO2	1	For the immediate identification and calculation of chemical errors elementary understandingin quantitative chemical analysis is very needful
CO2	PO1	3	Understanding the basic principle of chromatography techniques can be used to solveproblems related to these fields in engineering stream
	PO2	3	Basic knowledge on chromatography and organic polymers help to design and selectresources for various engineering activities
	PO12	3	Research based on chromatography and synthesis of organic polymers helps to design andreinforce the properties of engineering polymers

	PSO 1	1	The chromatographic techniques can be used as a device for the forecast, design andenactment of modern engineering materials
	PSO 2	1	To grow professionally in their careers via the use of spectroscopic techniques for theprediction and design of modern instruments.
CO 3	**PO 1**	3	Knowledge on spectrochemical techniques such as IR and NMR help to find solutions toengineering problems like structure analysis of materials
	PO 2	3	Understanding the basic concepts of spectroscopic techniques can be utilized for the analysisof the structural identification of the materials of importance.
	PO 12	3	Information acquired on the structural identification of compounds can be used to performstudies to solve complex problems
	PSO 1	1	The spectroscopic techniques can be used as a tool for the prediction, structural elucidation,designing and synthesizing of modern engineering materials
CO 4	**PO 1**	3	To study the basic ideas of instrumental techniques for chemical analysis help to bridge theconcept of theory of chemistry to practical applications in engineering fields
	PO 2	3	Students will be able to solve engineering problems related to instrumentational chemistry
	PO 12	3	Gathered Information on the instrumental analysis in chemistry can be utilized to conductstudies to solve problems in modern engineering materials

	PSO 1	1	The basic knowledge in instrumental analytical techniques in chemistry help to overcome thechallenges faced in chemical engineering fields
	PSO 2	1	Characterization methods via instruments based on chemical knowledge is needful forresolving issues in modern materials synthesis
CO 5	**PO 1**	3	With the basic information in chemical reactions, reaction conditions and safety of chemicalsstudents can successfully design and conduct a chemical reaction of specific importance
	PO 2	1	By using the knowledge on chemical reagents and solvents efficacious design of an object orprocess in engineering field if possible.
	PO 12	3	Can Solve chemical engineering problems by the acquaintance of theories of basic chemicalreactions
	PSO 2	1	Deep understanding of experimental procedures in chemistry helps to bridge the basicscience knowledge with practical applications
CO6	**PO1**	3	Doing lab experiments as a member of team help the students to communicate effectivelyand engage actively in future learning
	PO2	1	Team works during lab experiments facilitates students sharing attitude and helpingmentality.
	PO 12	3	With the help of basic knowledge in experiments on water chemistry can effectively use tosolve problems related to waste water management and environmental pollution
	PSO 1	1	By utilizing the principles of chemical experiments and safety students will be able to designnovel plants of specific importance

	PSO 2	1	Knowledge on various chemical reactions and methods students can effectively solve issuesof societal,health and environmental significance

2

EST 100	ENGINEERING MECHANICS	L	T	P	CREDIT	Year of Introduction
		2	1	0	3	2019

Prerequisite: Nil

Course Outcomes: After completion of the course the student will be able to:

EST 100.1	Recall principles and theorems related to rigid body mechanics	K2
EST 100.2	Identify and describe the components of system of forcesacting on the rigid body.	K3
EST 100.3	Apply the conditions of equilibrium to various practicalproblems involving different force system	K3
EST 100.4	Choose appropriate theorems, principles or formulae to solveproblems of mechanics	K3
EST 100.5	Solve problems involving rigid bodies, applying the propertiesof distributed areas and masses	K3

CO PO PSO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EST100.1	2	2	-	-	-	-	-	-	-	-	-	-		
EST100.2	3	3	-	-	-	-	-	-	-	-	-	-		
EST100.3	3	3	-	-	-	-	-	-	-	-	-	-		
EST100.4	3	3	-	-	-	-	-	-	-	-	-	-		
EST100.5	3	3	-	-	-	-	-	-	-	-	-	-		
EST100	2.80	2.80	-	-	-	-	-	-	-	-	-	-		

JUSTIFICATION

CO	PO	LEVEL	REMARKS
EST100.1	PO 1	2	The student will be able to solve complex engineeringproblems.
	PO 2	2	The student will be able to solve complex engineeringproblems.
EST100.2	PO 1	3	The knowledge of representing and solving problems in three dimensions.
	PO 2	3	The knowledge of representing and solving problems in three dimensions.
EST100.3	PO 1	3	The idea of properties of different cross sections that an engineer has to encounter in professional life is an important engineeringknowledge.
	PO 2	3	The idea of properties of different cross sections that an engineer has toencounter in professional life is an important engineering knowledge.
EST100.4	PO 1	3	Students will be able to apply appropriate theorems to solvethe problems.
	PO 2	3	Students will be able to apply the principles or formulae forsolving the problems
EST100.5	PO 1	3	Students will be able to solve problems on rigid bodies.
	PO 2	3	Students will be able to solve problems by applying theproperties of distributed areas and masses.

EST 130	BASICS OF ELECTRICAL ENGINEERING	L	T	P	CREDIT	Year of Introduction
		4	0	0	4	2019

Course Outcomes: After completion of the course the student will be able to:

CO1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
CO2	Develop and solve models of magnetic circuit
CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6			PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1												2	2	2	1
CO2	3	1												2	2		1
CO3	3	1												2	2	2	1

JUSTIFICATION

CO1	**PO1**	Able to know the fundamental concepts and circuit laws in simple DC circuit
	PO2	Able to analyse DC circuits
	PO12	Ability to solve simple problems associated with DC circuits
	PSO1	Students will be apply the knowledge of mathematics and science to solve various fundamental problems in DC circuits.
	PSO2	Students will be able to develop solution using DC circuits for further development of society
	PSO3	Students will be able to recognize the need for lifelong learning in the broadest context of technological change in the area of DC circuits
	PO1	Able to know fundamentals of magnetism and solve problems in magnetic circuits
	PO2	Able to analyse magnetic circuits

CO2	**PO12**	Ability to solve simple problems associated with Magnetic circuits
	PSO1	Students will be able to apply knowledge of magnetic circuits to solve engineering problems
	PSO3	Students will be able to recognize the need for lifelong learning in the field of magnetism and magnetic circuits
CO3	**PO1**	Able to apply the fundamental laws of electrical engineering to solve simple ac circuits problems
	PO2	Able to analyse AC circuits
	PO12	Ability to solve simple problems associated with AC circuits
	PSO1	Students will be apply the knowledge of mathematics and science to solve various fundamental problems in AC circuits.
	PSO2	Students will be able to develop solution using AC circuits for further development of society
	PSO3	Students will be able to recognize the need for lifelong learning in the broadest context of technological change in the area of AC circuits

EST 130	BASICS OF ELECTRONICS ENGINEERING	L	T	P	CREDIT	Year of Introduction
		4	0	0	4	2019

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 4	Describe working of a voltage amplifier	K2
CO 5	Outline the principle of an electronic instrumentation system	K2
CO 6	Explain the principle of radio and cellular communication	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 4	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO 6	2	-	-	-	-	-	-	-	-	-	-	2	-	-
EST 130														

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO4 – PO1	2	Knowledge in the working of a voltage amplifier will improve engineering skills.
CO5 – PO1	2	The principle of an electronic instrumentation system Will help to finding solutions for complex engineering problems.
CO6 – PO1	2	Knowledge in the principle of radio and cellular communication will improve engineering skills.
CO5 – PO12	2	The principle of an electronic instrumentation system can motivate the students to improve their knowledge to adapt technological changes.
CO6 – PO12	2	Knowledge in the principle of radio and cellular communication will motivate the students to improve their knowledge to adapt technological changes.

PHT 100	ENGINEERING PHYSICS A	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Compute the quantitative aspects of waves and oscillations in engineeringsystems.	**K3**
CO 2	Apply the interaction of light with matter through interference, diffraction andidentify these phenomena in different natural optical processes and optical instruments.	**K3**
CO 3	Analyze the behaviour of matter in the atomic and subatomic level through theprinciples of quantum mechanics to perceive the microscopic processes in electronic devices.	**K2**
CO 4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems	**K3**
CO 5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system	**K2**

CO PO MAPPING

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO 1	3	2	-	-	-	-	-	1	2	-	-	1	1	-	-
CO 2	3	2	-	-	-	-	-	1	2	-	-	1	-	-	-
CO 3	3	2	-	-	-	-	-	1	2	-	-	1	1	-	-
CO 4	3	1	-	-	-	-	-	1	2	-	-	1	1	-	-
CO 5	3	1	-	-	-	-	-	1	2	-	-	1	1	-	-
Average	3	1.6	-	-	-	-	-	1	2	-	-	1	1	-	-

JUSTIFICATION

Mapping	LEVEL	Justification
CO1-PO1	3	Compute the qualitative aspects of waves and oscillations in engineering systems like natural frequency, damped frequency, forced frequency, resonant frequency, Q-factor, frequency etc.
CO1-PO2	2	To identify the physics behind the flow of current and relevantinnovations in the respective branches.
CO1-PO8	1	Apply the principles of professional ethics by understanding thenorms of engineering practice.
CO1-PO9	2	To practice team work by combining individual responsibilities invarious class room activities.
CO1-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.
CO1-PSO1	1	The qualitative aspects of waves and oscillations to analyse and applying fundamental concepts.
CO2-PO1	3	Apply the interaction of light with matter through interference anddiffraction and to identify these phenomena in different natural optical processes and optical instruments. E.g.: Measurement of refractive index of materials, path difference and phase difference between waves, dispersive power and resolving power of plane transmission grating.
CO2-PO2	2	Use the first principles of interaction of light with matter and applythis to different optical processes and optical devices.

CO2-PO8	1	Apply the principles of professional ethics to various fields ofengineering practice.
CO2-PO9	2	To practice team work by combining individualresponsibilities in various class room activities.
CO2-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.
CO3 -PO1	3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. E.g.: Wave-function and it's physical significance, Schrodinger equations and application to particle in a one-dimensional box, tunnelling, Quantum confinement, properties of nanomaterials.
CO3-PO2	2	Use the principles of behaviour of matter in the atomic and subatomic level and analyse the various microscopic processes in scientific devices and Nano structures.
CO3-PO8	1	Apply the principles of professional ethics to various fields ofengineering practice.
CO3-PO9	2	To practice team work by combining individual responsibilities invarious class room activities.
CO3-PO12	1	To understand the use of new technologies and relevant innovationsin the respective branches.
CO3-PSO1	1	Analyse the behaviour of matter in the atomic and subatomic levelthrough the principles of quantum mechanics to identify fundamental concepts.
CO4-PO1	3	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems. E.g.: Faraday's Laws, Para, dia, ferromagnetism, Physical significance of gradient, divergence and curl and its applications, displacement current and propagation of electromagnetic waves.
CO4-PO2	1	To identify the physics behind the properties of magnetic materials and apply vector calculus in analysing problems related toengineering practice.
CO4-PO8	1	Apply the principles of professional ethics by understanding thenorms of engineering practice.
CO4-PO9	2	To practice team work by combining individual responsibilities invarious class room activities.
CO4-PO12	1	To understand the use of new technologies and relevantinnovations in the respective branches.
CO4-PSO1	1	Classify the properties of magnetic materials and apply vector calculus to identify fundamental concepts.

CO5-PO1	3	Analyse the principles behind various superconducting applications, explain the working of solid-state lighting devices and fibre optic communication system. E.g.: Meissner effect, classification of superconducting materials, Qualitative idea of BCS theory. Working of various photonic devices like LED, various Photo detectors, Solar cell, Classification of Optical fibre cable based on refractive index, significance of Numerical aperture, fibre optic communication system and fibre optic sensors.
CO5-PO2	1	To identify the physics behind the Superconducting phenomenonand fibre optics and relevant innovations in the respective branches.
CO5-PO8	1	Apply the principles of professional ethics by understanding the norms of engineering practice.
CO5-PO9	2	To practice team work by combining individual responsibilities invarious class room activities.
CO5-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.
CO5-PSO1	1	Analyse the principles behind various superconducting phenomena.

PHL 120	ENGINEERING PHYSICS LAB	L	T	P	CREDIT	Year of Introduction
		0	0	2	1	2019

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories	**K3**
CO 2	Understand the need for precise measurement practices for datarecording	**K3**
CO 3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations	**K3**
CO 4	Analyze the techniques and skills associated with modern scientifictools such as lasers and fiber optics	**K3**
CO 5	Develop basic communication skills through working in groups inperforming the laboratory experiments and by interpreting the results	**K2**

Mapping of course outcomes with program outcomes

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	-	-	-	3	-	-	1	2	-	-	1	1	-	-
CO 2	3	-	-	-	3	-	-	1	2	-	-	1	1	-	-
CO 3	3	-	-	-	3	-	-	1	2	-	-	1	-	-	-
CO 4	3	-	-	-	3	-	-	1	2	-	-	1	1	1	-
CO 5	3	-	-	-	3	-	-	1	2	-	-	1	1	1	-
Averag e	3	-	-	-	3	-	-	1	2	-	-	1	1	1	-

JUSTIFICATION

Mapping	LEVEL	Justificati on
CO1-PO1	3	Designing of instruments, structures and analysis using toolsrequires fundamentals of oscillations, resonance and waves.
CO1-PO5	3	Applying the theoretical knowledge of resonance and waves todesign an conduct experiments for data interpretation.
CO1-PO8	1	Apply the principles of professional ethics by understanding thenorms of engineering practice.
CO1-PO9	2	To practice team work by combining individual responsibilities in various class room activities.
CO1-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.
CO1-PSO1	1	To develop experimental skills for analysing the fundamentalconcepts.
CO2-PO1	3	Designing of instruments, structures and analysis tools require fundamentals of interference and diffractionengineering problems.

CO2-PO5	3	Applying the theoretical knowledge of interference and diffraction to design and conduct experiments for data interpretation.
CO2-PO8	1	Apply the principles of professional ethics to various fields ofengineering practice.
CO2-PO9	2	To practice team work by combining individualresponsibilities in various class room activities.
CO2-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.
CO2-PSO1	1	To Understand the need for precise measurement practices fordata recording in various engineering problems.
CO3 -PO1	3	Analyse the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. E.g.: Wave-function and it's physical significance, Schrodinger equations and application to particle in a one-dimensional box, tunnelling, Quantum confinement, properties of nanomaterials.
CO3-PO5	3	Use the principles of behaviour of matter in the atomic and subatomic level and analyse the various microscopic processes in scientific devices and Nano structures.
CO3-PO8	1	Apply the principles of professional ethics to various fields of engineering practice.
CO3-PO9	2	To practice team work by combining individual responsibilities in various class room activities.
CO3-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.
CO4-PO1	3	Apply the fundamental knowledge of electricity and magnetism forsolving various engineering problems.
CO4-PO5	3	To practice effective communication by various presentations in class and laboratory sessions.
CO4-PO8	1	Apply the principles of professional ethics to various fields of engineering practice.
CO4-PO9	2	To practice team work by combining individual responsibilities in various class room activities.
CO4-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.

CO4-PSO1	1	Analyze the techniques and skills associated with modern scientifictools such as lasers and fiber optics.
CO4-PSO2	1	To understand the principle, concept, working and applications in theoretical calculations.
CO5-PO1	3	Application of photonics and fiber optics in various branches ofengineering.
CO5-PO5	3	Applying the theoretical knowledge of laser, photonics and fiber optics for data interpretation.
CO5-PO8	1	Apply the principles of professional ethics to various fields of engineering practice.
CO5-PO9	2	To practice team work by combining individual responsibilities in various class room activities.
CO5-PO12	1	To understand the use of new technologies and relevant innovations in the respective branches.
CO5-PSO1	1	Develop basic communication skills through working in groups in performing the laboratory experiments in finding the results.
CO5-PSO2	1	To understand the principle, concept, working and applications ofrelevant technologies and comparison of results with theoretical calculations by applying fundamental concepts.

HUN 102	PROFESSIONAL COMMUNICATION	L	T	P	CREDIT	Year of Introduction
		2	0	2	-	2019

Course Outcomes (CO)

After the successful completion of this course, students will able to

CO 1	Develop vocabulary and language skills relevant to engineering as a profession(k3)
CO 2	Analyze, interpret and effectively summarize a variety of textual content(k3)
CO 3	Create effective technical presentations(k2)
CO 4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus(k5)
CO 5	Identify drawbacks in listening patterns and apply listening techniques for specific needs(k3)
CO 6	Create professional and technical documents that are clear and adhering to all the necessary conventions(k6)

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	2	-	-	2	2	1	3			1
CO2	1	1	-	-	-	-	-	-	3	-	-	3			1
CO3	-	-	-	-	-	1	-	-	1	3	1	-			1
CO4	1	2	-	-	-	-	-	-	-	2	1	1			1

CO5	-	3	2	1	-	-	-	-	-	1	-	1			1
CO6	-	-	-	-	-	1	-	-	2	3	-	1	1	1	

JUSTIFICATION

CO	PO	MAPPING	JUSTIFICATION
CO1	**PO6**	2	Graduate should be able to understand the textual content given to assesssocietal, health and legal issues
	PO9	2	Graduate need to effectively communicate as a member or leader of a team toconstructively work towards providing solution for engineering problems
	PO10	2	Graduate need to effectively communicate using language effectively tocomprehend and write effective report
	PO11	1	Graduate needs to communicate effectively knowledge and understanding ofengineering principles in order to manage projects
	PO12	3	Graduate need to develop vocabulary and language skills relevant toengineering as a professional to engage in life long learning
	PS03	1	Graduate need to develop vocabulary and language skills relevant toengineering as a professional to engage in life long learning
CO2	**PO1**	1	Graduate will be able to apply different reading styles to analyze , interpret &effectively summarize a variety of textual content
	PO2	1	Graduate need to develop reading skills in order to develop sustained conclusions to complex engineering problems
	PO9	3	Graduate need to effectively summarize ,analyses and interpret the textualcontent in order to function effectively in a team
	PO11		Graduate should able to utilize various reading skills to demonstrate knowledgeand understanding of engineering principles
	PO12	3	Graduate need to analyze , interpret & effectively summarize a variety of textualcontent to effectively engage in life long learning
	PS03	1	Graduate need to analyze , interpret & effectively summarize a variety of textualcontent to effectively engage in life long learning

CO3	**PO6**	1	Graduate should be able to create technical presentation based on contextualknowledge to convey societal, health and legal issues
	PO9	1	Graduate need to effectively create technical presentation to convey ideas andsolutions in a team
	PO10	3	Graduate need to effectively create technical presentation to convey ideas
	PO11	1	Graduate need to effectively create technical presentation to demonstrate theiracquired knowledge through effective presentation
	PS03	1	graduates need to create effective presentations to pursue life long learning

CO4	**PO1**	1	Graduate need to effectively conduct healthy group discussion to analyses ,understand and learn various methodologies towards efficient electrical systemdesign
	PO2	2	Graduate need to actively involve in group discussions to able to arrive atoptimal conclusion towards development of electrical system
	PO10	2	Graduate need to discuss technical solution related to complex engineeringtopics in a group setting and arrive at generalization /consensus
	PO11	1	Graduates need to be able to communicate in a group for effective projectmanagement
	PO12	1	Graduate need to discuss technical solution related to complex engineering problems to advance in research and development
	PS03	1	Graduates need to have good communication skill in a group setting to pursuelife l;ong learning
CO5	**PO2**	3	Graduate need to apply proper listening skills and analyze them to constructively contribute to sustained conclusions to complex engineeringproblems
	PO3	2	Graduate need to implement appropriate listening skills to understand thespecified needs to find solution for complex engineering problems
	PO4	1	Graduate need to apply listening skills for synthesis of information to providevalid conclusion
	PO10	1	Graduates need to listen effectively to arrive at proper reports on activitiesbeing conducted

	PO12	1	Graduates need to listen effectively to pursue life long learning
	PS03	1	Graduates need to have good listening skills to pursue life long learning
CO6	**PO6**	1	Graduate need to create technical document that convey the textual knowledgeassociated to an engineering system
	PO9	2	Graduates need to create professional & technical document that will help theteam or indiviual work effectively
	PO10	3	Graduates need to create professional & technical document to communicateideas and projects effectively
	PO12	1	Graduates need to create professional documents to pursue life long learning
	PSO1	1	Graduates need to be able to create effective technical reports to
	PSO2	1	Graduates need to be able to create effective technical reports to derivesustainable solutions to complex electrical systems

EST 102	PROGRAMMING IN C	L	T	P	CREDIT	Year of Introduction
		2	1	2	4	2019

Course Outcomes (CO)

After the successful completion of this course, students will able to

C102.1	Analyse a computational problem and develop an algorithm/flowchart to find itssolution (K3)
C102.2	Develop readable C programs with branching and looping statements, which usesArithmetic, Logical, Relational or Bitwise operators. (K3)
C102.3	Write readable C programs with arrays, structure or union for storing the data to beProcessed. (K3)
C102.4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem. (K3)
C102.5	Write readable C programs which use pointers for array processing and parameterpassing. (K3)
C102.6	Develop readable C programs with files for reading input and storing output. (K3)

Mapping of course outcomes with program outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C205.1	3	3	3	2	-	2	-	-	-	3	3	3	-	-	-
C205.2	3	3	3	2	2	-	-	-	-	2	-	3	-	-	-
C205.3	3	3	3	1	2	-	-	-	-	2	-	3	-	-	-
C205.4	3	3	3	1	2	-	-	-	-	2	3	3	-	-	-

C205.5	3	3	-	-	2	-	-	-	-	1	-	3	-	-	-
C205.6	3	3	-	-	2	-	-	-	-	1	-	3	-	-	-
Average	3	3	3	2	2	2	-	-	-	2	3	3	-	-	-

JUSTIFICATION

CO	PO	LEVEL	REMARKS
CO 1	PO 1	3	By understanding the logic of analyzing the problem and developing the algorithm, students will be able to apply the knowledge to complexengineering problems.
	PO 2	3	By understanding the logic of analyzing the problem and developing the algorithm, students will be able to identify, formulate and analyze engineering problems.
	PO 3	3	By understanding the logic of analyzing the problem and developing thealgorithm students will be able to design solutions for very simple engineering problems.
	PO4	2	By understanding the logic of analyzing the problem and developing the algorithm students will be able to use research knowledge for theanalysis and interpretation of data.
	PO6	2	By understanding the logic of analyzing the problem and developing thealgorithm students will be able to communicate on complex engineering activities with the engineering community.
	PO10	3	By understanding the logic of analyzing the problem and developing the algorithm students will be able to communicate effectively on complexengineering activities with the engineering community.
	PO11	3	By understanding the logic of analyzing the problem and developing thealgorithm students will be able to manage projects in a team.

	PO12	3	By understanding the logic of analyzing the problem and developing thealgorithm students will be able to engage in continuous learning.
CO 2	PO 1	3	By understanding how to develop a program in C language using loops, branching statements and operators, students will be able to apply theknowledge in complex engineering problems.
	PO 2	3	By understanding how to develop a program in C language using loops,branching statements and operators, students will be able to apply identify, formulate and analyze simple engineering problems.
	PO3	3	By understanding how to develop a program in C language using loops, branching statements and operators, students will be able to designsolutions for very simple engineering problems.
	PO4	2	By understanding how to develop a program in C language using loops, branching statements and operators, students will be able to use research knowledge for the analysis and interpretation of data.
	PO5	2	By understanding how to develop a program in C language using loops, branching statements and operators, students will be able to use moderntools

	PO10	2	By understanding how to develop a program in C language using loops, branching statements and operators, student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO12	3	By understanding how to develop a program in C language using loops, branching statements and operators, students will be able to engage in continuous learning
	PO 1	3	By understanding how to develop a program in C language using arrays, structure and union, student will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	3	By understanding how to develop a program in C language using arrays, structure and union, student will be able to identify, analyze and make conclusions of simple engineering problems.

Signed By:Devassia V P
Date:14.09.2023 19:21

CO 3	**PO 3**	3	By understanding how to develop a program in C language using arrays, structure and union, student will be able to design solutions for simple engineering problems.
	PO 4	1	By understanding how to develop a program in C language using arrays, structure and union, student will be able to conduct investigations of complex problems and provide valid conclusions.
	PO 5	2	By understanding how to develop a program in C language using arrays, structure and union, student will be able to use modern tools for the implementation of concepts.
	PO10	2	By understanding how to develop a program in C language using arrays, structure and union, student will be able to communicate effectively about the numerical methods to the engineering community.
	PO12	3	By understanding how to develop a program in C language using arrays, structure and union, student will be able to engage in continuous learning.
CO4	**PO 1**	3	By understanding how to develop a program in C language using function and recursion, student will be able to apply the knowledge to find solution of complex engineering problems.

	PO 2	3	By understanding how to develop a program in C language using function and recursion, student will be able to identify, analyze and make conclusions of simple engineering problems.
	PO 3	3	By understanding how to develop a program in C language using function and recursion, student will be able to design solutions for simple engineering problems.
	PO 4	1	By understanding how to develop a program in C language using function and recursion, student will be able to conduct investigations of complex problems and provide valid conclusions.
	PO 5	2	By understanding how to develop a program in C language using function and recursion, student will be able to use modern tools for the implementation of concepts.

	PO10	2	By understanding how to develop a program in C language using function and recursion, student will be able to communicate effectively about the numerical methods to the engineering community.
	PO11	3	By understanding how to develop a program in C language using function and recursion, students will be able to manage projects in a team.
	PO12	3	By understanding how to develop a program in C language using function and recursion, student will be able to engage in continuous learning.
CO5	**PO 1**	3	By understanding how to develop a program in C language using array processing and parameter passing, student will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	3	By understanding how to develop a program in C language using array processing and parameter passing, student will be able to identify, analyze and make conclusions of simple engineering problems.
	PO 5	2	By understanding how to develop a program in C language using array processing and parameter passing, student will be able to use modern tools for the implementation of concepts.

	PO10	1	By understanding how to develop a program in C language using array processing and parameter passing, student will be able to communicate effectively about the numerical methods to the engineering community.
	PO12	3	By understanding how to develop a program in C language using array processing and parameter passing, student will be able to engage in continuous learning.
	PO 1	3	By understanding how to develop a program in C language using files, student will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	3	By understanding how to develop a program in C language using files, student will be able to identify, analyze and make conclusions of simple engineering problems.

CO6	**PO 5**	2	By understanding how to develop a program in C language using files, student will be able to use modern tools for the implementation of concepts.
	PO10	1	By understanding how to develop a program in C language files, student will be able to communicate effectively about the numerical methods to the engineering community.
	PO12	3	By understanding how to develop a program in C language using files, student will be able to engage in continuous learning.

MAT 102	VECTOR CALCULUS DIFFERENTIAL EQUATION AND TRANSFORMS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Prerequisite: Calculus of single and multi- variable functions

Course Outcomes: After completion of the course the student will be able to:

CO1	Compute the derivatives and line integrals of vector functions and learn their applications
CO2	Evaluate surface and volume integrals and learn their inter relations and application
CO3	Solve homogeneous and non- homogeneous linear differential equation with constant coefficient
CO4	Compute Laplace transform and apply them to solve ODEs arising in engineering
CO5	Determine the Fourier transform of functions and apply them to solve problems arising in engineering

Mapping of course outcomes with program outcomes (Minimum requirement)

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

JUSTIFICATION

CO	PO	LEVEL	REMARKS
CO 1	PO 1	3	By understanding the modern theory of vector calculus students willbe able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the vector calculus students will be able to identify, formulate and analyze simple engineering problems.
	PO 3	3	By understanding the differential equation students will be able todesign solutions for very simple engineering problems.

	PO 4	3	By understanding the vector calculus students will be able to useresearch knowledge for the analysis and interpretation of data.
	PO 5	2	By understanding the vector calculus students will be able to usemodern tools
	PO 6	1	By understanding derivatives students will be able to communicateon complex engineering activities with the engineering community.

	PO 9	1	By understanding derivatives students will be able to engage incontinuous learning.
	PO 10	2	By understanding vector calculus and derivatives the student will beable to communicate effectively on complex engineering activities with the engineering community.
	PO 12	2	By understanding derivatives the student will be able to engage incontinuous learning.
	PSO 1	1	By understanding vector calculus and derivatives the student will be able to apply knowledge of mathematics ,science and engineeringto design commission and maintain various type of electrical systems and address challenges in the field
	PO 1	3	By understanding surface and volume integrals the students will beable to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the surface and volume integrals the students willbe able to apply identify, formulate and analyze simple engineeringproblems.

CO2	**PO3**	3	By understanding the surface and volume integrals students will beable to design solutions for very simple engineering problems.
	PO4	3	By understanding the volume and surface integrals students will be able to use research knowledge for the analysis and interpretation ofdata.
	PO5	2	By understanding the volume and surface integrals students will beable to use modern tools

	PO6	1	By understanding the volume and surface integrals students will beable to communicate on complex engineering activities with the engineering community and with the society.
	PO9	1	By understanding the volume and surface integrals students will beable to engage in continuous learning.
	PO10	2	By understanding the surface and volume integrals and learn their inter relations and application the student will be able to communicate effectively on complex engineering activities with theengineering community.
	PO12	2	By understanding the surface and volume integrals the students willbe able to engage in continuous learning
	PSO1	1	By understanding the surface and volume integrals the students will beable to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field

CO 3	**PO 1**	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto apply the knowledge to find solution of complex engineering problems.
	PO 2	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto identify, analyze and make conclusions of simple engineering problems.
	PO 3	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto design solutions for simple engineering problems.

	PO 4	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto conduct investigations of complex problems and provide valid conclusions.
	PO 5	2	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto use modern tools like R for the implementation of concepts.
	PO 6	1	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto communicate effectively on complex engineering activities with the engineering community.

	PO9	1	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto engage in continuous learning.
	PO10	2	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto communicate effectively about the numerical methods to the engineering community.
	PO12	2	By understanding the homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ableto engage in continuous learning.
	PSO 1	1	By understanding the homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be ablefor applying knowledge of mathematics ,science and engineeringto design commission and maintain various type of electrical systems and address challenges in the field

CO4	**PO 1**	3	By understanding the Laplace transform the student will be ableto apply the knowledge on complex engineering problems.
	PO 2	3	By understanding the Laplace transform the student will be ableto identify formulate and analyze simple engineering problems.
	PO 3	3	By understanding the Laplace transform the student will be ableto design solutions for simple engineering problems.
	PO4	3	By understanding the Laplace transform the student will be able to use research knowledge for the analysis and interpretation of data.

	PO 5	2	By understanding the Laplace transform, the student will be able to use modern tools like Matlab, Mathematica, Maple etc.for the implementation of concepts.
	PO 6	1	By understanding the Laplace transform the student will be ableto communicate effectively about the numerical methods to the engineering community.
	PO 9	1	By understanding the Laplace transform the student will be ableto engage in continuous learning.
	PO10	2	By understanding the Laplace transform the students will beable to communicate effectively on complex engineering activities with the engineering community.
	PO12	2	By understanding the Laplace transform the students will be able to the student will be able to engage in continuous learning.

	PSO1	1	By understanding the Laplace transform the student will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various typeof electrical systems and address challenges in the field
CO5	**PO 1**	3	By understanding the Fourier transform and functions the students will be able to apply the knowledge on complex engineering problems..
	PO 2	3	By understanding the Fourier transform and functions thestudents will be able to the student will be able to identify formulate and analyze simple engineering problems.

	PO 3	3	By understanding the Fourier transform and functions thestudents will be able to the student will be able to design solutions for simple engineering problems.
	PO 4	3	By understanding the Fourier transform and functions the students will be able to the student will be able to use researchknowledge for the analysis and interpretation of data.
	PO 5	2	By understanding the Fourier transform and functions the students will be able to the student will be able to use moderntools for the implementation of concepts.
	PO 6	1	By understanding the Fourier transform and functions the students will be able to the student will be able to communicateeffectively on complex engineering activities with the engineering community.
	PO 9	1	By understanding the Fourier transform and functions the students will be able to the student will be able to engage incontinuous learning.
	PO10	2	By understanding the Fourier transform and functions the students will be able to communicate effectively on complexengineering activities with the engineering community.

	PO12	2	By understanding the Fourier transform and functions thestudent will be able to engage in continuous learning.
	PS O1	1	By understanding the Fourier transform and functions the students will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and addresschallenges in the field

ESL 130	BASIC ELECTRICAL WORKSHOP	L	T	P	CREDIT	Year of Introduction
		0	0	2	1	2019

Course Outcomes: After completion of the course the student will be able to:

CO1	Demonstrate safety measures against electric shocks
CO2	Identify the tools used for electrical wiring, electrical accessories,wires, cables, batteries and standard symbols
CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
CO7	Work in a team with good interpersonal skills

MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	3	-	-	-	-	-	1	-	1	-
CO2	2	-	-	-	-	-	-	-	-	1	-	-	2	-	-
CO3	2	-	-	1	-	1	-	1	2	2	-	2	3	-	-
CO7	-	-	-	-	-	-	-	-	3	2	-	2	1	1	3
AVG	2	-	-	1	-	2	-	1	2.5	1.67	-	1.67	2	1	3

JUSTIFICATION

CO	PO	MAPPING	JUSTIFICATION
CO1	PO6	3	Completely compatible with CO, because students are using contextual knowledge to safeguard one's life.
	PO12	1	It leads to lifelong learning for students
	PSO1	1	Knowledge of safety measures against electrical shocks will help in following work ethics at the work place
CO2	PO1	2	Applying practical knowledge in engineering, so that complex engineering problems can be solved.
	PO10	1	Communicate effectively on complex engineering activities
	PSO1	2	Knowledge of tools, electrical accessories, wires, cables, batteries is required to design and maintain electrical systems
CO3	PO1	2	Applying practical knowledge in engineering, so that complex engineering problems can be solved.
	PO4	1	Helps students to conduct investigations of complex problems by practicing it by themselves.
	PO6	1	Students are getting responsibilities relevant to the professional engineering practice
	PO8	1	Appling ethical principles
	PO9	2	Functioning effectively as an individual, and as a member, leader in diverse teams etc.
	PO10	2	Communicate effectively on complex engineering activities
	PO12	2	It leads to lifelong learning for students
	PSO1	3	Developing connection diagrams for circuits is imperative for designing and maintaining various electrical systems
CO7	PO9	3	Functioning effectively as an individual, and as a member, leader in diverse teams etc.
	PO10	2	Communicate effectively on complex engineering activities
	PO12	2	It leads to lifelong learning for students
	PSO1	1	Working in a team and applying engineering knowledge will help in designing, commissioning and maintaining an engineering system
	PSO2	1	Working in a team will help in deriving faster solution to complex engineering problems

Signed By:Devassia V P
Date:14.09.2023 19:21

	PSO3	3	While working in a team, one learns from other team members and this is imperative for life-long learning and developing interpersonal skills

ESL 130	BASIC ELECTRONICS WORKSHOP	L	T	P	CREDIT	Year of Introduction
		0	0	2	1	2019

Course Outcomes: After completion of the course the student will be able to:

CO4	Identify and test various electronic components
CO5	Draw circuit schematics with EDA tools
CO6	Assemble and test electronic circuits on boards

MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3				1				2			2			
CO2	3				2			2	2			2			
CO3	3				2				2			1			
AVG															

JUSTIFICATION

Mapping	Mapping Level (3/2/1)	Justifications
CO4 - PO1	3	Students are expected to utilize engineering knowledge for the identification and testing of various electronic components
CO4 - PO5	1	Students are expected to identify certain problems by understanding the testing of various electronic components
CO4 - PO9	2	Students are expected to function effectively as an individual and in a team during the identification and testing of various electronic components
CO4 – PO12	2	Identification and testing of various electronic components will help the students to develop the ability to engage in independent and life-long learning, in the broadest context of technological change.
CO5 - PO1	3	Students are expected to apply the electronic circuit knowledge to draw the circuit schematic
CO5 - PO5	2	Students are expected to utilize the appropriate EDA softwares effectively to draw the circuit schematic.
CO5 - PO8	2	Students are expected to apply the ethical rules and commit to professional ethics in the laboratory.
CO5 - PO9	2	Students are expected to function effectively as an individual to obtain the expected outcome
CO5 - PO12	2	Use of the software tools enable the students to engage in independent and lifelong learning
CO6 - PO1	3	Students are expected to apply knowledge of Electronic circuits to rectify problems while assembling and testing electronic circuits on board.
CO6 - PO5	2	Students are expected to create, select, and apply appropriate techniques and resources, to assemble and test electronic circuits on board.
CO6 – PO9	2	Students are expected to design documentation of the various electronic circuit experiments, effectively as an individual and in a team.
CO6 - PO12	1	Students are expected to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the area of electronic circuits.

Signed By:Devassia V P
Date:14.09.2023 19:21

3

EET 201	CIRCUITS AND NETWORKS	L	T	P	CREDIT	Year of Introduction
		2	2	0	4	2019

Course Outcomes: After completion of the course the student will be able to:

CO1	Apply circuit theorems to simplify and solve complex DC and AC electric networks
CO2	Analyse dynamic DC and AC circuits and develop the complete response toexcitations.
CO3	Solve dynamic circuits by applying transformation to s-domain.
CO4	Analyse three-phase networks in Y and Δ configurations.
CO5	Solve series /parallel resonant circuits
CO6	Develop the representation of two-port networks using network parameters andanalyse.

MAPPING

	PO.1	PO.2	PO .3	PO .4	PO .5	PO .6	PO .7	PO .8	PO .9	PO .10	PO .11	PO .12	PSO .1	PSO .2	PSO .3
CO1	3	3										3	3	2	2
CO2	3	3										3	3	2	2
CO3	3	3										3	3	2	2
CO4	3	3										3	3	2	2
CO5	3	3										3	3	2	2
CO6	3	3										3	3	2	2

JUSTIFICATION

CO1	An in-depth knowledge of mathematics and electrical engineering (PO1) Able to analyse problems of complex DC and AC electric networks by applying various theorems (PO2). Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of steady state analysis of electric circuits for various applications.
CO2	An in-depth knowledge of mathematics and electrical engineering (PO1) Problem formulation and transient & steady state analysis of ac and dc circuits (PO2). Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of transient analysis of electric circuits for various applications.

Signed By:Devassia V P
Date:14.09.2023 19:21

CO3	An in-depth knowledge of mathematics especially the Laplace Transform and Inverse Laplace Transform (PO1) Problem formulation and transient & steady state analysis of ac and dc circuits using Laplace Transformation (PO2). Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of transient analysis in S-domain for electric circuits used in various applications.
CO4	An in-depth knowledge of mathematics and electrical engineering (PO1) Able to analyse three phase circuits in Y and Δ configurations (PO2). Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) for the analysis of three phase circuits in power system
CO5	An in-depth knowledge of mathematics and electrical engineering (PO1) Able to analyse Series and Parallel resonant circuits (PO2). Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) for the analysis of resonant circuits used in various applications
CO6	`An in-depth knowledge of mathematics and electrical engineering (PO1) Able to analyse any two port networks in terms of various network parameters (PO2).
	Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) for the analysis of two port network used in various applications

EEL 201	CIRCUITS AND MEASUREMENT -S LAB	L	T	P	CREDIT	Year of Introduction
		0	0	3	2	2019

Course Outcomes: After completion of the course the student will be able to:

CO1	Analyse voltage current relations of RLC circuits
CO2	Verify DC network theorems by setting up various electric circuits
CO3	Measure power in a single and three phase circuits by various methods
CO4	Calibrate various meters used in electrical systems
CO5	Determine magnetic characteristics of different electrical devices
CO6	Analyse the characteristics of various types of transducer systems
CO7	Determine electrical parameters using various bridges
CO8	Analyse the performance of various electronic devices for aninstrumentation systems and, to develop the team management and documentation capabilities.

MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2						2			3	2	1	-
CO2	3	3							2			3	2	1	-
CO3	3	3							2			3	2	1	-
CO4	3	3	2						2			3	2	1	-
CO5	3	3							2			3	2	1	-
CO6	3	3	2						2			3	2	1	-
CO7	3	3							2			3	2	1	-
CO8	3	3	3	3	2				3	3	3	3	3	3	2

JUSTIFICATION

CO1	Apply the knowledge of mathematics and electrical engineering fundamentals (PO1) Analyse series and parallel RLC circuits using basic principles of mathematics and electrical engineering (PO2) Design and develop RLC circuits for various applications to meet the specific needs(PO3) Able to work as a team for designing various electric circuits(PO9) Able to engage in lifelong learning for the analysis of electric circuits (PO12) Apply knowledge(PSO1) and derive solutions (PSO2) of various electric circuits for various applications.

CO2	Apply the knowledge of mathematics and electrical engineering fundamentals (PO1) Apply the basic principles of mathematics and engineering sciences for the analysis of a given circuit (PO2) Able to work as a team for investigating the response of dc circuits using network theorems (PO9) Able to engage in lifelong learning for the analysis of dc electric circuits (PO12) Apply knowledge(PSO1) and derive solutions (PSO2) of various dc circuits for various applications.
CO3	Identify the engineering knowledge for single phase and three phase power measurements (PO1) Apply the basic principles of mathematics and electrical engineering for the analysis single phase and three phase circuits (PO2) Able to work as a team for investigating the response of single phase and three phase circuits (PO9) Able to engage in lifelong learning for the analysis of single phase and three phase circuits (PO12) Apply knowledge(PSO1) and derive solutions (PSO2) of various single phase and three phase circuits used for various applications.

CO4	Apply the knowledge of mathematics and electrical engineering fundamentals(PO1) Apply the basic principles of mathematics and electrical engineering for thecalibration of various meters and developing solutions (PO2, PO3) Able to work as a team for investigating the error of dc and ac meters used in various applications(PO9) Able to engage in lifelong learning for the calibration of ac and dc meters used in various applications (PO12) Apply engineering knowledge(PSO1) to find errors in ac and dc meters used for various applications and derive solutions to rectify it(PSO2).
CO5	Apply the knowledge of mathematics and electrical engineering to determine the magnetization characteristics (PO1) Apply the basic principles of mathematics and electrical engineering for the determination of magnetization curve of a magnetic specimen used in various applications. (PO2) Able to work as a team for investigating the characteristics of a magnetic specimen used in various applications (PO9) Able to engage in lifelong learning for determining the magnetic characteristics ofa magnetic specimen used in various applications (PO12) Apply engineering knowledge(PSO1) to determine the magnetization characteristics and derive solutions to improve it(PSO2).

CO6	Apply the knowledge of electrical and electronics engineering fundamentals (PO1) Apply the basic principles of electrical and electronics engineering for analysingthe characteristics of various transducers used in different applications (PO2, PO3) Able to work as a team for investigating characteristics of various transducers usedin different applications (PO9) Able to engage in lifelong learning for identifying and selecting various transducers for different applications (PO12) Apply engineering knowledge(PSO1) to determine suitable transducer for a particular application and derive solutions for engineering problems (PSO2).
CO7	Apply the knowledge of electrical and instrumentation engineering fundamentals (PO1) Apply the basic principles of electrical and instrumentation engineering for determining the unknown electric parameters by using various bridges (PO2) Able to work as a team for determining the unknown electrical parameters by using various bridges (PO9) Able to engage in lifelong learning for determining the unknown electrical parameters of various meters by using various bridges (PO12) Apply electrical and instrumentation engineering knowledge(PSO1) to determine the unknown electrical parameters and derive solutions for engineering problems (PSO2).
CO8	Able to have knowledge about electrical and electronics engineering for developing circuits for instrumentation applications(PO1) Able to design and develop electrical and electronic circuits used for various instrumentation applications (PO2, PO3) Able to design experiments and analyse various electrical and electronic circuits (PO4) Able to simulate and analyse various electrical and electronic circuits using any simulation tool (PO5) Able to work as a team to electrical and electronic circuits used for various instrumentation applications (PO9) Able to communicate effectively about electrical and electronic circuits applications by doing course projects and thereby able to comprehend and summarize the evaluation. (PO10) Able to demonstrate knowledge and understanding of the by doing course project and thereby develop the team management and documentation capabilities. Able to engage in lifelong learning of designing different electrical and electronic circuits for various applications(PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong

	learning (PSO3) of electrical and electronic circuits used for various instrumentation application

MAT 201	PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Prerequisite: Nil

Course Outcomes: After completion of the course the student will be able to:

CO 1	Understand the concept and the solution of partial differential equation
CO 2	Analyse and solve one dimensional wave equation and heat equation.
CO 3	Understand complex functions, its continuity differentiability with the useof Cauchy Riemann equations.
CO 4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy'sintegral formula, understand the series expansion of analytic function.
CO 5	Understand the series expansion of complex function about a singularityand Apply residue theorem to compute several kinds of real integrals.

Mapping of course outcomes with program outcomes (Minimum requirement)

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

JUSTIFICATION

CO	PO	LEVEL	REMARKS
CO1			By understanding the concept and solution of partial differential equations students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the concept and solution of partial differential equations students will be able to identify, formulate and analyse simple engineering problems.
	PO 3	3	By understanding the concept and solution of partial differential equations students will be able to develop solutions for very simple engineering problems.
	PO4	3	By understanding the concept and solution of partial differential equations students will be able to use research knowledge for the analysis and interpretation of data.
	PO5	2	By understanding the concept and solution of partial differential equations students will be able to use modern tools like Matlab forthe implementation of concepts.

Signed By:Devassia V P
Date:14.09.2023 19:21

	PO6	1	By understanding the concept and solution of partial differential equations students will be able to solve real-life engineering problems, design and development of innovative and cost-effective products exhibiting a solid foundation in electronics and engineering fundamentals to cater needs of society.
	PO10	2	By understanding the concept and solution of partial differential equations students will be able to communicate on complex engineering activities with the engineering community.
	PO12	2	By understanding the concept and solution of partial differential equations students will be able to engage in continuous learning.
	PSO1	2	By understanding the concept and solution of partial differential equations students will be able to Apply knowledge of mathematics, science and engineering to design commission and maintain various type of electrical systems and address challenges in the field.
CO 2	PO 1	3	By understanding the concept and solution of wave and heat equations students will be able to apply the knowledge in complexengineering problems.
	PO 2	3	By understanding how to solve one dimensional wave equation and heat equation, the students will be able to apply identify, formulate and analyze simple engineering problems.
	PO3	3	By understanding the modern theory of continuous probability distribution students will be able to design solutions for very simple engineering problems.
	PO4	3	By understanding how to solve one dimensional wave equation and heat equation students will be able to use research knowledge for the analysis and interpretation of data.

	PO5	2	By understanding how to solve one dimensional wave equation and heat equation students will be able to use modern tools for the implementation of concepts
	PO6	1	By understanding how to solve one dimensional wave equation and heat equation students will be able to communicate on complex engineering activities with the engineering community and with the society.
	PO10	2	By understanding the concept and solution of partial differential equations students will be able to communicate on complex engineering activities with the engineering community.
	PO12	2	By understanding how to solve one dimensional wave equation and heat equation students will be able to engage in continuous learning.
	PSO1	2	By understanding how to solve one dimensional wave equation and heat equation students will be able to Apply knowledge of mathematics, science and engineering to design commission and maintain various type of electrical systems and address challenges in the field.
CO 3	PO 1	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, students will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to identify, analyze and make conclusions of simple engineering problems.
	PO 3	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to design solutions for simple engineering problems.

	PO 4	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to conduct investigations of complex problems and provide valid conclusions.
	PO 5	2	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to use modern tools like R for the implementation of concepts.
	PO 6	1	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO10	2	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to engage in continuous learning.
	PO12	2	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations students will be able to engage in continuous learning.
	PSO1	2	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to Apply knowledge of mathematics, science and engineering to design commission and maintain various type of electrical systems and address challenges in the field.

CO 4	PO 1	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, thestudent will be able to apply the knowledge on complex engineering problems.
	PO 2	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to identify formulate and analyze simpleengineering problems.
	PO 3	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, thestudent will be able to design solutions for simple engineering problems.
	PO 4	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, thestudent will be able to use research knowledge for the analysis and interpretation of data.
	PO 5	2	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to use modern tools like Matlab, Mathematica, Maple etc. for the implementation of concepts.
	PO 6	1	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, thestudent will be able to communicate effectively on complexengineering activities with the engineering community.
	PO10	2	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, thestudent will be able to engage in continuous learning.
	PO12	2	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, thestudents will be able to engage in continuous learning.

Signed By:Devassia V P
Date:14.09.2023 19:21

CO5	PSO1	2	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to Apply knowledge of mathematics, science and engineering to design commission and maintain various type of electrical systems and address challenges in the field.
	PO 1	**3**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to apply the knowledge on complex engineering problems.
	PO 2	**3**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	**3**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to design solutions for simple engineering problems.
	PO 4	**3**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to use research knowledge for the analysis and interpretation of data.
	PO 5	**2**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to use modern tools for the implementation of concepts.
	PO 6	**1**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO10	**2**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to engage in continuous learning.
	PO12	**2**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to engage in continuous learning.
	PSO1	**2**	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the student will be able to Apply knowledge of mathematics, science and engineering to design commission and maintain various type of electrical systems and address challenges

			in the field.

EET 203	MEASUREMENTS AND INSTRUMENTATION	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Course Outcomes

CO1	Identify and analyse the factors affecting performance of measuring system(k1)
CO2	Choose appropriate instruments for the measurement of voltage, current in ac and dc measurements(k1)
CO3	Explain the operating principle of power and energy measurement(k1)
CO4	Outline the principles of operation of Magnetic measurement systems(k1)
CO5	Describe the operating principle of DC and AC bridges, transducers based systems.(k2)
CO6	Understand the operating principles of basic building blocks of digital systems, recording and display units(k2)

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	1	-	-	-	-	-	-	-	-	-	-	2	2	2
CO2	3	1	-	-	-	-	-	-	-	-	-	-	2	2	2
CO3	3	1	-	-	-	-	-	-	-	-	-	-	2	2	2
CO4	3	-	-	-	-	-	-	-	-	-	-	-	2	2	2
CO5	3	-	-	-	1	-	-	-	-	-	-	2	2	2	2
CO6	3	-	-	-	2	-	-	-	-	-	-	2	2	2	2

JUSTIFICATION

CO	PO	MAPPING	JUSTIFICATION
CO 1	PO1	2	By studying the factors affecting the performance of measuring system engineering knowledge for designing measurement system is gathering.
	PO2	**1**	By studying the factors affecting the performance of measuring system adding up problem analyzing skills
	PSO 1	**2**	Knowledge of of measuring system is required to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of measuring system is required to find solutions to complex electrical engineering problems
	PSO 3	**2**	Knowledge of measuring system is required to equip electrical engineers for life long learning
CO 2	**PO1**	**3**	Knowledge of appropriate instruments is required to use in electrical engineering
	PO2	**1**	Knowledge of appropriate instruments is required to solve different types of problems in electrical engineering
	PSO 1	**2**	Knowledge of instruments and its working is required to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of measuring system and instruments are required to find solutions to complex electrical engineering problems
	PSO 3	**2**	Knowledge of measuring system and instruments is required to equip electrical engineers for life long learning
CO 3	**PO1**	**3**	Knowledge of principle of measurement of power and energy is required to solve different operational problems in electrical engineering
	PO2	**1**	Knowledge of principle of measurement of power and energy is required for problem analysis in electric systems
	PSO 1	**2**	Knowledge of principle of measurement of power and energy is necessary to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of principle of measurement of power and energy is required to find solutions to complex electrical engineering problems
	PSO 3	**2**	Knowledge of principle of measurement of power and energy is required to equip electrical engineers for life long learning

CO 4	**PO1**	**3**	Knowledge of magnetic measurements is required to solve different operational problems in electrical engineering
	PSO 1	**2**	Knowledge of magnetic measurements is required to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of magnetic measurements is required find solutions to complex electrical engineering problems
	PSO 3	**2**	Knowledge of magnetic measurements is required to equip electrical engineers for life long learning
CO 5	**PO1**	**3**	Knowledge of bridges and transducers is required to solve different operational problems in electrical engineering
	PO5	**1**	Knowledge of bridges and transducers is required for enabling modern tool usage for electrical engineers
	PO12	**2**	Knowledge of bridges and transducers is required to equip electrical engineers for life long learning
	PSO 1	**2**	Knowledge of bridges and transducers is required to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of bridges and transducers is required find solutions to complex electrical engineering problems
	PSO 3	**2**	Knowledge of bridges and transducers is required to equip electrical engineers for life long learning
CO6	**PO1**	**3**	Knowledge of recording and display units is required to solve different operational problems in electrical engineering
	PO5	**2**	Knowledge of recording and display units is required for enabling modern tool usage for electrical engineers
	PO12	**2**	Knowledge of recording and display units is required to equip electrical engineers for life long learning
	PSO 1	**2**	Knowledge of recording and display units is required to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of recording and display units is required find solutions to complex electrical engineering problems
	PSO 3	**2**	Knowledge of recording and display units is required to equip electrical engineers for life long learning

HUT 200	PROFESSIONAL ETHICS	L	T	P	CREDIT	Year of Introduction
		2	0	0	2	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
HUT200.1	Understand the core values that shape the ethical behaviour of aprofessional.	K2
HUT200.2	Adopt a good character and follow an ethical life.	K3
HUT200.3	Explain the role and responsibility in technological development bykeeping personal ethics and legal ethics.	K2
HUT200.4	Solve moral and ethical problems through exploration and assessment by established experiments.	K2
HUT200.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.	K3

MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	2	-	-	2	-	-	-
CO2	-	-	-	-	-	-	-	2	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	3	-	-	2	-	-	-
CO4	-	-	-	-	-	-	-	3	-	-	2	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	2	-	-	-
AVG	-	-	-	-	-	-	-	2.6	-	-	2	-	-	-

JUSTIFICATION

CO-PO-PSO	LEVEL	JUSTIFICATION
CO1-PO8	2	By understanding the core values that shape the ethical behavior of a professional, the student will be able to apply ethical norms intoengineering practices.
CO2-PO8	2	By applying ethical principles, students will be able to shoulder responsibilities with professional commitment.
CO3-PO8	3	By keeping personal ethics and legal ethics, students will be able toput ethical principles in engineering practices.
CO4-PO8	3	By following ethical and moral assessment, students will be able to develop responsible norms in engineering practices.
CO5-PO8	3	The student can adopt human and social values in solving contemporary global issues confronting and engineer.
CO1-PO11	2	By understanding the core values that shape ethical behavior of an individual, the student will be able to demonstrate engineering and management principles in teamwork in multidisciplinary environments
CO2-PO11	2	By adopting good character based on ethical values , students will be able to perform well as team leaders in engineering and managementresponsibilities.
CO3-PO11	2	By following personal ethics and legal ethics, students will be able to become successful engineer and management professionals..
CO4-PO11	2	Through exploration and assessment by established experiments,students will be able to excel in project management and finance.
CO5-PO11	2	By applying knowledge of human values and social values, studentswill be able to apply them in his / her own work either as a team leader or as a team member.

Signed By:Devassia V P
Date:14.09.2023 19:21

EET 205	ANALOG ELECTRONICS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOME

CO	Course outcome	Knowledge level
CO1	Design biasing scheme for transistor circuits.	K3
CO2	Model BJT and FET amplifier circuits.	K2
CO3	Identify a power amplifier with appropriate specifications for electronic circuit applications.	K2
CO4	Describe the operation of oscillator circuits using BJT.	K2
CO5	Explain the basic concepts of Operational amplifier (OPAMP)	K2
CO6	Design and develop various OPAMP application circuits.	K3

MAPPING

	PO .1	PO .2	PO .3	PO .4	PO .5	PO .6	PO .7	PO .8	PO .9	PO. 10	PO. 11	PO.12	PSO 1	PSO 2	PSO 3
CO1	2	2	2										1		
CO2	2	2	2										1		
CO3			1	2									1		
CO4	2	2	2										1		
CO5			1	2									1		
CO6	2	2	2										1		

JUSTIFICATION

CO1	An in-depth knowledge of electronics engineering (PO1) Design of different BJT biasing schemes (PO2). Solution of h parameter for BJT(PO3). Apply knowledge of mathematics, science and engineering to design biasing scheme for transistor circuits. (PSO1)
CO2	An in-depth knowledge of electronics engineering (PO1) Analysis of small signal models of BJT & FET (PO2) Analysis of h parameter for BJT(PO3). Understand model of amplifier circuits to design & commission of various types of electrical systems. (PSO1)
CO3	Calculate efficiency of power amplifiers(PO3). Review of power amplifier circuits using BJT (PO4) Apply knowledge of mathematics, science and engineering to design a power amplifier.(PSO1)
CO4	An in-depth knowledge of electronics engineering (PO1) Analysis of different oscillators using BJT(PO2). Review of different oscillators using BJT (PO3) Apply knowledge of mathematics, science and engineering to design of oscillator circuits. (PSO1)
CO5	Design of square and triangular generators (PO4). Analysis and design of zero crossing detectors(PO3). Apply knowledge of mathematics, science and engineering to understand basic concepts of OPAMP. (PSO1)
CO6	An in-depth knowledge of electronics engineering (PO1) Review of different opamps (PO2). Design solution of integrator and differentiators (PO3). Apply knowledge of mathematics, science and engineering to design & develop OPAMP application circuits. (PSO1)

EEL 203	**ANALOG ELECTRONICS LAB**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		0	0	3	2	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
CO1	Use the various electronic instruments and for conducting experiments.	K2
CO2	Design and develop various electronic circuits using diodes and Zenerdiodes.	K2
CO3	Design and implement amplifier and oscillator circuits using BJT and JFET.	K2
CO4	Design and implement basic circuits using IC (OPAMP and 555 timers).	K2
CO5	Simulate electronic circuits using any circuit simulation software.	K2
CO6	Use PCB layout software for circuit design	K2

MAPPING

	PO .1	PO .2	PO .3	PO .4	PO .5	PO .6	PO .7	PO .8	PO .9	PO. 10	PO. 11	PO.12	PSO 1	PSO 2	PSO 3
CO1	2								2						
CO2	2	2	2						2						
CO3	2	2	2						2						
CO4	2	2	2						2						
CO5	1	1			3				3						
CO6	1				3				3						

JUSTIFICATION

CO1	Students can apply the knowledge of basic engineering to select various electronic instruments and for conducting experiments. (PO1) Student will be able to work as a team and function effectively in multidisciplinary environments (PO9)

Signed By:Devassia V P
Date:14.09.2023 19:21

CO2	Apply the knowledge of electronics engineering fundamentals to develop various electronic circuits using diodes and Zener diodes. (PO1) Able to analyse various wave shaping circuits (PO2) Able to design and develop different wave shaping circuits using diode (PO3) Student will be able to work as a team and function effectively in multidisciplinary environments (PO9)
CO3	Apply the knowledge of electronics engineering fundamentals to understand the operation of amplifier & oscillator circuits (PO1) Able to analyse amplifier & oscillator circuits (PO2) Able to design and develop BJT and JFET amplifier & oscillator circuits circuits for various applications (PO3) Able to work as a team for investigating the frequency response of BJT and JFET amplifier circuits (PO9) Apply knowledge(PSO1) and for developing various amplifier & oscillator circuits which is essential to take up life long learning in electrical engineering domain. (PSO3)
CO4	Apply the knowledge of electrical and electronics engineering fundamentals to understand the operation of basic circuits using OPAMP and 555 timer. (PO1)
	Able to analyse various circuits using OPAmp and 555 timer (PO2) Able to design and develop circuits for specific application including waveform generation using OPAmp and 555 timer (PO3) Able to work as a team for investigating the performance of various circuits using OPAMP & 555 IC (PO9) Apply knowledge(PSO1) for developing various OPAMP & 555 timer IC circuits which is essential to take up life long learning.(PO3)

CO5	Apply the knowledge of electrical and electronics engineering fundamentals to understand the operation of various electronic circuits (PO1) Able to analyse various electronic circuits using any simulation software (PO2) Able to develop and analyze electronic circuits with the use of simulation tools (PO5) Student will be able to work as a team and function effectively in multidisciplinary environments (PO9) Apply knowledge(PSO1) in electrical and electronics engineering and develop (PSO2) simulation model for the analysis of electronic circuits which is essential to take up life long learning in electrical engineering domain.(PSO3)
CO6	Apply the knowledge of electrical and electronics engineering fundamentals to Use PCB layout software for circuit design. (PO1) Able to develop electronic circuits with the use PCB layout software. (PO5) Student will be able to work as a team and function effectively in multidisciplinary environments (PO9) Apply knowledge (PSO1) in electrical and electronics engineering and design (PSO2) PCB layout for the development of electronic circuits which is essential to take up life long learning in electrical engineering domain.(PSO3)

MCN 201	**SUSTAINABLE ENGINEERING**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		2	0	0	-	2019

COURSE OUTCOMES

No.	Course outcomes	Knowledge Level
CO1	Understand the relevance and the concept of sustainability and the global initiatives in this direction	**K2**
CO2	Explain the different types of environmental pollution problems and their sustainable solutions	**K2**
CO3	Discuss the environmental regulations and standards	**K2**
CO4	Outline the concepts related to conventional and non-conventional energy	**K2**
CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles	**K3**

MAPPING

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

JUSTIFICATION

	LEVEL	JUSTIFICATION
CO1 -PO6	**2**	The knowledge about the concept and importance of sustainability will help the student to focus better on societal, health, safety and cultural aspects of his/her profession
CO1 -PO7	**3**	The course entirely deals with environment and sustainability, and thusall the course outcomes fully contributes to this program outcome
CO1 -PO12	**2**	Sustainable engineering is one of the elements of ethical engineering practices.
CO2 -PO6	**2**	Student's understanding of causes, effects and control of pollution contributes to making him/her a responsible engineer
CO2 -PO7	**3**	The course entirely deals with environment and sustainability, and thusall the course outcomes fully contributes to this program outcome
CO2 -PO12	**2**	Provides scope for implementation of strategies to curb environmental pollution
CO3 -PO6	**2**	Student's basic knowledge of environmental standards and environmental impact assessment will guide him/her in the assessmentof his/her engineering practice.
CO3 -PO7	**3**	The course entirely deals with environment and sustainability, and thusall the course outcomes fully contributes to this program outcome

CO3 -PO12	**2**	Leads to more efficient energy management systems based on EIA
CO4 -PO 6	**2**	The understanding of basic concepts on conventional and non-conventional energy sources will enable the student to understand importance of energy efficient systems
CO4 -PO 7	**3**	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO4 -PO 12	**2**	Leads to more efficient utilization of resource and energy consumption
CO5 -PO 6	**2**	The student's understanding of sustainable development will help him be a responsible engineer working for the benefit of the society.
CO5 -PO 7	**3**	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO5 -PO 12	**2**	Helps the student to opt for sustainable energy resources where applicable in the project.

Signed By:Devassia V P
Date:14.09.2023 19:21

4

MAT 204	PROBABILITY DISTRIBUTIONS , RANDOM PROCESSES AND NUMERICAL METHODS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

CO 1	Understand the concept , properties and important models of discrete random variables and using them analyze suitable random phenomenon
CO 2	Understand the concept , properties and important models of continuousrandom variables and using them analyze suitable random phenomena.
CO 3	Analyse random processes using autocorrelation, power spectrum and Poisson process model as appropriate
CO 4	Compute roots of equations evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques.
CO 5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.

MAPPING

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

AVERAGE	3	2	2	2	2					2		1	1		

JUSTIFICATION

CO	PO	LEVEL	REMARKS
CO 1	PO 1	3	By understanding the modern theory of discrete probability distribution students will be able to apply the knowledge in complex engineering problems.
	PO 2	2	By understanding the modern theory of discrete probability distribution students will be able to identify,formulate and analyse engineering problems.
	PO 3	2	By understanding the modern theory of discrete probability distribution students will be able to design solutions for very simple engineering problems.
	PO4	2	By understanding the modern theory of discrete probability distribution students will be able to use research knowledgefor the analysis and interpretation of data.
	PO5	2	By understanding the modern theory of discrete probability distribution students will be able to use modern tools like Rfor the implementation of concepts.
	PO10	2	By understanding the modern theory of discrete probability distribution students will be able to communicate on complex engineering activities with the engineering community.
	PO12	1	By understanding the modern theory of discrete probability distribution students will be able to engage in continuous learning.

Signed By:Devassia V P
Date:14.09.2023 19:21

	PSO1	1	By understanding the modern theory of discrete probability distribution students will be able to apply knowledge of mathematics,science and engineering to design commissionand maintain various type of electrical systems and address challenges in the field
	PSO2		
CO 2	PO 1	3	By understanding the modern theory of continuous probability distribution the students will be able to apply theknowledge in complex engineering problems.
	PO 2	2	By understanding the modern theory of continuous probability distribution the students will be able to apply identify, formulate and analyze simple engineering problems.
	PO3	2	By understanding the modern theory of continuous probability distribution students will be able to design solutions for very simple engineering problems.
	PO4	2	By understanding the modern theory of continuous probability distribution students will be able to use researchknowledge for the analysis and interpretation of data.
	PO5	2	By understanding the modern theory of continuous probability distribution students will be able to use modern tools like R for the implementation of concepts
	PO10	2	By understanding the modern theory of continuous probability distribution students will be able to communicate on complex engineering activities with the engineering community and with the society.
	PO12	1	By understanding the modern theory of continuous probability distribution students will be able to engage in continuous learning.
	PSO1	1	By understanding the modern theory of continuous probability distribution students will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field
	PSO2		

CO3	**PO 1**	3	By analysing random processes using autocorrelation, power spectrum and Poisson process model , the student will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	2	By analysing random processes using autocorrelation, power spectrum and Poisson process model , the student will be able to identify, analyze and make conclusions of simple engineering problems.
	PO 3	2	By analysing random processes using autocorrelation, power spectrum and Poisson process model ,, the student will be able to design solutions for simple engineering problems.
	PO 4	2	By analysing random processes using autocorrelation, power spectrum and Poisson process model , the student will be able to conduct investigations of complex problems and provide valid conclusions.
	PO 5	2	By analysing random processes using autocorrelation, power spectrum and Poisson process model , the student will be able to use modern tools for the implementation of concepts.
	PO 10	2	By analysing random processes using autocorrelation, power spectrum and Poisson process model ,, the student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO12	1	By analysing random processes using autocorrelation, power spectrum and Poisson process model , the student will be able to engage in continuous learning.
	PSO1	1	By analysing random processes using autocorrelation, power spectrum and Poisson process model , the student will be ableto apply knowledge of mathematics ,science and engineering to design commission and maintain various typeof electrical systems and address challenges in the field
	PSO2		
	PO 1	3	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to apply the knowledge on complex engineering problems.

Signed By:Devassia V P
Date:14.09.2023 19:21

CO 4	PO 2	2	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	2	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to design solutions for simple engineering problems.
	PO4	2	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to use research knowledge for the analysis and interpretation ofdata.
	PO 5	2	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to use moderntools like Matlab, Mathematica, Maple etc. for the implementation of concepts.
	PO 10	2	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to communicate effectively about the numerical methods to the engineering community.
	PO 12	1	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to engage in continuous learning.
	PSO1	1	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field
	PSO2		

CO 5	PO 1	3	By understanding standard numerical techniques for solving systems of equations, fitting curves on given numerical dataand solving ordinary differential equations the students will be able to apply the knowledge on complex engineering problems..

	PO 2	2	By understanding standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations the students will beable to the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	2	By understanding standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations the students will beable to the student will be able to design solutions for simple engineering problems.
	PO 4	2	By understanding standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations the students will beable to the student will be able to use research knowledge forthe analysis and interpretation of data.
	PO 5	2	By understanding standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations the students will beable to the student will be able to use modern tools like Matlab, Mathematica, Maple etc. for the implementation of concepts.
	PO 10	2	By understanding standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations the students will beable to the student will be able to communicate effectively on complex engineering activities with the engineering community.

	PO 12	1	By understanding standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations the students will beable to the student will be able to engage in continuous learning.
	PSO 1	1	By understanding standard numerical techniques for solving systems of equations the students will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field

MCN 202	CONSTITUTION OF INDIA	L	T	P	CREDIT	Year of Introduction
		2	0	0	-	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
MCN202.1	Explain the background of the present constitution of India and features.	K2
MCN202.2	Utilize the fundamental rights and duties.	K3
MCN202.3	Understand the working of the union executive, parliament and judiciary.	K2
MCN202.4	Understand the working of the state executive, legislature and judiciary	K2
MCN202.5	Utilize the special provisions and statutory institutions	K3
MCN202.6	Show national and patriotic spirit as responsible citizens of the country.	K3

MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	2	2	-	2	-	-	-	-	-
CO2	-	-	-	-	-	3	3	3	-	3	-	-	-	-	-
CO3	-	-	-	-	-	3	2	3	-	3	-	-	-	-	-
CO4	-	-	-	-	-	3	2	3	-	3	-	-	-	-	-
CO5	-	-	-	-	-	3	2	3	-	3	-	-	-	-	-
CO6	-	-	-	-	-	3	3	3	-	2	-	-	-	-	-
AVG	-	-	-	-	-	2.83	2.33	2.83	-	2.66	-	-	-	-	-

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
MCN202.1-PO6	2	Understanding the background of the present constitution of India and its features, students are able to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.1-PO7	2	Understanding the background of the present constitution of India and its features, students are able to treat sustainable development is an integral part of life under article 21 of Indian Constitution.
MCN202.1-PO8	2	Understanding the background of the present constitution of India and its features, students are able to show ethical values like integrity, transparency, accountability, impartiality, public welfare and equity which are the guiding principles of Indian constitution.

MCN202.1-PO10	2	Understanding the background of the present constitution of India and its features, students are able to communicate judgements of various landmark cases and the amendments of articles in the constitution.
MCN202.2-PO6	3	Knowledge gained from the study of fundamental rights and duties, students are able to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.2-PO7	3	Knowledge gained from the study of fundamental rights and duties; students are able to practice the duty imposed on every citizen to protect environment as stated in Article 48 A.
MCN202.2-PO8	3	Knowledge gained from the study of fundamental rights and duties, students are able to issue public statements in an objective and truthful manner.
MCN202.2-PO10	3	Knowledge gained from the study of fundamental rights and duties; students are able to raise their voice effectively if the fundamental rights are denied and also communicate the fundamental duties one should perform.
MCN202.3-PO6	3	Understand the working of the union executive, parliament and judiciary, students are able to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.3-PO7	M	With the knowledge gained from the working of the union executive, parliament and judiciary, students are able to understand the key role played in achieving the development goals and targets through, for instance, setting and implementing water quality policy frameworks and standards, and regulating the discharge of pollutants into the environment and wastewater management, recycling and reuse.
MCN202.3-PO8	H	With the knowledge gained from the working of the union executive, parliament and judiciary, students are able to understand the government ethics applies to the process, behavior, and policy of governments and the public officials who serve in elected or appointed positions. It also covers issues of honesty and transparency in government, dealing with matters such as bribery, political corruption, police corruption, legislative ethics, regulatory ethics, conflict of interest, avoiding the appearance of impropriety, open government and legal

		ethics.
MCN202.3-PO10	H	With the knowledge gained from the working of the union executive, parliament and judiciary, students are able to understand the government communication involves not only sending out persuasive messages to the public, but also explaining working policies, creating awareness of the rights of the citizens, and developing mechanisms that enable two-way communication between citizen and government.
MCN202.4-PO6	H	Understand the working of the state executive, legislature and judiciary, students are able to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.4-PO7	M	With the knowledge gained from the working of the state executive, legislature and judiciary, students are able to understand the key role played in achieving the development goals and targets through, for instance, setting and implementing water quality policy frameworks and standards, and regulating the discharge of pollutants into the environment and wastewater management, recycling and reuse.
MCN202.4-PO8	H	With the knowledge gained from the working of the state executive, legislature and judiciary, students are able to understand the government ethicsapplies to the process, behavior, and policy of governments and the public officials who serve in
		elected or appointed positions. It also covers issues of honesty and transparency in government, dealing with matters such as bribery, political corruption, police corruption, legislative ethics, regulatory ethics, conflict of interest, avoiding the appearance of impropriety, open government and legal ethics.

MCN202.4-PO10	H	With the knowledge gained from the working of the state executive, legislature and judiciary, students are able to understand the government communication involves not only sending out persuasive messages to the public, but also explaining working policies, creating awareness of the rights of the citizens, and developing mechanisms that enable two-way communication between citizen and government.
MCN202.5-PO6	H	With the knowledge gained on special provisions and statutory institutions, the students are able to understand that the State shall promote with special care the educational and economic interests of the weaker sections of the society and in particular, of the Scheduled Castes and Scheduled Tribes and shall protect them from social injustice and all forms of exploitation.
MCN202.5-PO7	M	With the knowledge gained on special provisions and statutory institutions, the students are able to understand that the State shall endeavor to protect and improve the environment. Various cases include Bhopal gas leakage tragedy, Taj Mahal case.
MCN202.5-PO8	H	With the knowledge gained on special provisions and statutory institutions, the students are able to understand that the various statutory institutions and ethical practices followed; SEBI issued a code on conflicts of interests for members on board of the regulator.
MCN202.5-PO10	H	With the knowledge gained on special provisions and statutory institutions, the students are able to understand that in most cases the justification for creation of a statutory body to give advice to Government is to introduce expertise of a particular kind or kinds into the decision-making process.
MCN202.6-PO6	H	After the completion of the course, the students are able to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; supporting and being responsible for your family, your community and all levels of government with your willingness to work, to volunteer, to pay your share of taxes and pay.
MCN202.6-PO7	H	After the completion of the course, the students are able to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; rise of social movements that closely connect problems of environment protection with nationalist concerns - Eco-nationalism.

MCN202.6-PO8	H	After the completion of the course, the students are able to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; supporting and being responsible for your family, your community and all levels of government with your willingness to work, to volunteer, to pay your share of taxes and pay, fightagainst corruptions.
MCN202.6-PO10	M	After the completion of the course, the students are able to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; fight against corruptions, raise the voice if your fundamental rights are denied, organize campaigns to create awareness among illiterate ones about their fundamental rights and duties.

EET 204	ELECTROMAGNETIC THEORY	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

CO1	Apply vector analysis and coordinate systems to solve static electric and magnetic field problems(k3)
CO2	Apply Gausses Law, Coulumbs Law and Poisons Eqauation to determine electrostatic field parameters(k3)
CO3	Determine Magnetic fields from current distributions by applying Biot-Sarvats law and Ampers circuital Law(k3)
CO4	Apply Maxwells Equation for the solution of time varying fields(k3)
CO5	Analyse Electromagnetic Wave Propagation in different media(k3)

MAPPING

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

JUSTIFICATION

CO	PO	MAPPING	JUSTIFICATION
	PO1	2	Knowledge of Vector analysis and coordinate systems is required to solve static electric and magnetic field problems in electrical engineering

Signed By:Devassia V P
Date:14.09.2023 19:21

CO 1	PO2	3	Knowledge of Vector analysis and coordinate systems is required to analyse static electric and magnetic field problems in electrical engineering
	PSO 1	2	Knowledge of Vector analysis and coordinate systems is required to designand maintain various systems in electrical engineering
	PS03	1	Knowledge of Vector analysis and coordinate systems is required to equip electrical engineers for life long learning
CO 2	PO1	2	Knowledge of fundamental laws is required to solve static electric andmagnetic field problems in electrical engineering
	PO2	3	Knowledge of fundamental laws is required to analyse static electric and magnetic field problems in electrical engineering
	PSO 1	1	Knowledge of fundamental laws is required to design and maintain varioussystems in electrical engineering
CO 3	PO1	2	Knowledge of fundamental laws is required to solve static electric and magnetic field problems in electrical engineering
	PO2	3	Knowledge of fundamental laws is required to analyse static electric andmagnetic field problems in electrical engineering
	PSO 1	1	Knowledge of fundamental laws is required to design and maintain varioussystems in electrical engineering
	PS03		
CO 4	PO1	2	Knowledge of fundamental Maxwells laws is required to solve static electricand magnetic field problems in electrical engineering
	PO2	3	Knowledge of fundamental Maxwells laws is required to analyse static electric and magnetic field problems in electrical engineering
	PSO 1	1	Knowledge of fundamental MAxwells laws is required to design and maintainvarious systems in electrical engineering
CO 5	PO1	2	Knowledge of EM Wave Propagation is required to solve static electric and magnetic field problems in electrical engineering
	PO2	3	Knowledge of EM Wave Propagation is required to analyse static electric andmagnetic field problems in electrical engineering
	PSO 1	1	Knowledge of EM Wave Propagation is required to design and maintain various systems in electrical engineering

EEL 204	DIGITAL ELECTRONICS LAB	L	T	P	CREDIT	Year of Introduction
		0	0	3	2	2019

COURSE OUTCOMES

CO 1	Formulate digital functions using Boolean Algebra and verify experimentally
CO 2	Design and implement combinational logic circuits.
CO 3	Design and implement sequential logic circuits.
CO 4	Design and fabricate a digital circuit using the knowledge acquired from the laboratory

MAPPING

	PO.1	**PO.2**	**PO.3**	**PO.4**	**PO.5**	**PO.6**	**PO.7**	**PO.8**	**PO.9**	**PO.10**	**PO.11**	**PO.12**	**PSO1**	**PSO2**	**PSO3**
CO 1	3	1	1	3	3			2	3	3		1	2		1
CO 2	3	3	3	3	3			2	3	3		1	2		1
CO 3	3	3	3	3	3			2	3	3		1	2		1
CO 4	3	2	1	3	2			2	3	3	2	3	2		1

JUSTIFICATION

Justification of mapping		
	PO1	
	PO2	

CO 1	PO3 PO4 PO5 PO8 PO9 PO10 PO12 PSO1 PSO3	To be able to Verify and Realise De Morgan's theorem Realise SOP and POS by K Map Design and verify Half Adder and Full Adder Design Adder/Subtractor and BCD Adder
CO 2	PO1 PO2 PO3 PO4 PO5 PO8 PO9 PO10 PO12 PSO1 PSO3	To be able to Realise 2 bit comparator using gates and study of IC 7485 Design and Set up BCD to Decimal decoder and 7 segment display Design multiplexers Study and Realise different Flip Flops using gates
	PO1 PO2 PO3 PO4	

CO 3	PO5 PO8 PO9 PO10 PO12 PSO1 PSO3 PO1 PO2 PO3 PO4 PO5 PO8	To be able to Realise ripple counters using flip flops Design and set up Synchronous counters Realise Serial IN/OUT registers using flip flops Study and Design shift registers and Ring and Johnson CounterVHDL implementation of full adder and comparator
CO 4	PO9 PO10 PO11 PO12 PSO1 PSO3	To be able to Design and fabricate a digital circuit based on different experimentsdone

EET 206	DIGITAL ELECTRONICS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

CO1	Identify various number systems, binary codes and formulate digital functions using Boolean algebra.(K2)
CO2	Design and implement combinational logic circuits.(K3)
CO3	Design and implement sequential logic circuits.(K3)
CO4	Compare the operation of various analog to digital and digital to analog conversion circuits.(K3)
CO5	Explain the basic concepts of programmable logic devices and VHDL.(K3)

MAPPING

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

JUSTIFICATION

CO	PO	MAPPING	JUSTIFICATION

CO 1	PO1	3	Knowledge of various number systems, binary codes are required for digital systems in electronics engineering
	PO2	1	Knowledge of various number systems, binary codes are required to formulate digital functions using Boolean algebra
	PSO 1	2	Knowledge of various number systems, binary codes and formulation of digitalfunctions is required to design various digital systems in electrical engineering
	PS03	1	Knowledge of various number systems, binary codes and formulation of digital functions is required to equip electrical engineers for lifelong learning
CO 2	PO1	3	Knowledge of logic gates is required for combinational logic circuits in electrical engineering
	PO2	**3**	Knowledge of logic gates is required to formulate Boolean algebraic functions corresponds to combinational logic circuits in electrical engineering
	PO3	**2**	Knowledge of combinational logic circuit is required to design and implement Multiplexers, Demultiplexers, Encoders and Decoders.
	PSO 1	**1**	Knowledge of combinational logic circuits is required to design systems in electrical engineering
CO 3	**PO1**	**3**	Knowledge of flip flops are required for sequential logic circuits in electrical engineering
	PO2	**3**	Knowledge of sequential logic circuits is required to identify and design counters in electrical engineering
	PO3	**2**	Knowledge of sequential logic circuits are required to design and implement Synchronous and asynchronous counters, Johnson counter and ring counter.
	PSO 1	**1**	Knowledge of sequential logic circuits is required to to design systems in electrical engineering
CO 4	**PO1**	**3**	Knowledge of various analog to digital and digital to analog conversion circuits is required in analog and digital systems in electrical engineering
	PO2	**2**	Knowledge of ADC and DAC is required to design certain systems in electrical engineering
	PO3	**1**	Knowledge of ADC and DAC is required to design various electrical systems
	PSO 1	**1**	Knowledge of ADC and DAC is required to design and maintain various systems in electrical engineering

CO 5	**PO1**	**3**	Knowledge of the basic concepts of PLC and VHDL in various electrical systems
	PO2	**2**	Knowledge of VHDL to analyze different types of circuits
	PO3	**2**	Knowledge of the basic concepts of PLC and VHDL is required to design circuits in various electrical systems
	PO5	**2**	Knowledge of VHDL programming in xiling suite is required to design various systems in electrical engineering
	PSO 1	**1**	Knowledge of PLC and VHDL programming is required to design and maintain various systems in electrical engineering

EET 202	**DC MACHINES AND TRANSFORMERS**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		2	2	0	4	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET202.1	Acquire knowledge about constructional details of DC machines	K2
EET202.2	Describe the performance characteristics of DC generators	K2
EET202.3	Describe the principle of operation of DC motors and select appropriate motor types for different applications	K2
EET202.4	Acquire knowledge in testing of DC machines to assess its performance	K2
EET202.5	Describe the constructional details and modes of operation of single phase and three phase transformers	K2
EET202.6	Analyse the performance of transformers under various conditions	K2

MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
EET202.1	3	2			2							3	1		
EET202.2	3	2				2						3	1		
EET202.3	3	2	2			2						3	1		
EET202.4	3	3				2						3	1		
EET202.5	3					2						3	2	2	
EET202.6	3					2						3	2	2	
Average	**3**	**1.5**	**0.33**		**0.33**	**1.67**						**3**	**1.33**	**0.67**	

JUSTIFICATION

CO	PO/ PSO	Map ping	Justification
EET202.1	PO1	3	Students will be able to apply the knowledge about constructional details of DC machines.
	PO2	2	Students will be able to analyse the performance of dc machines by using principles of mathematics, natural sciences, and engineering sciences.
	PO5	2	Students will be able to select and apply appropriate techniques, resources, and modern engineering and IT tools for understanding the construction of DC machines.
	PO12	3	Students will be able to have lifelong learning with technological changes in improvement of DC machines.
	PSO1	1	Students will be able to apply the engineering knowledge on constructional details of DC machines.
EET202.2	PO1	3	Students will be able to describe the performance characteristics of DC generators.
	PO2	2	Students will be able to analyse the DC generators using the performance characteristics.
	PO6	2	Students will be able to apply reasoning based on performance characteristics of DC generators for the responsibilities relevant to the professional engineering practice.
	PO12	3	Students will be able to have lifelong learning with technological changes in operation of DC generators.
	PSO1	1	Students will be able to apply the engineering knowledge on performance characteristics of DC generators.
EET202.3	PO1	3	Students will be able to apply the knowledge to describe the principle of operation of DC motors.
	PO2	2	Students will be able to analyse the DC motors by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	2	Students will be able to select appropriate motor types for different applications.
	PO6	2	Students will be able to apply reasoning for the selection of appropriate motor for various applications.
	PO12	3	Students will be able to have lifelong learning with technological changes in types of DC motors.
	PSO1	1	Students will be able to apply the engineering knowledge to describe the principle of operation of DC motors and selection of appropriate motors.
EET202.4	PO1	3	Students will be able to describe the knowledge on testing of DC machines to assess its performance.
	PO2	3	Students will be able to analyse the performance of DC machines by using various testing methods.
	PO6	2	Students will be able to apply various methods of testing for DC machines.
	PO12	3	Students will be able to have lifelong learning with technological

			changes in testing of DC machines.
	PSO1	1	Students will be able to apply the engineering knowledge to describe the types of testing for DC machines.
	PO1	3	Students will be able to describe constructional details and modes of operation of single phase and three phase transformers.
	PO6	2	Students will be able to apply reasoning for the selection of appropriate transformers for various applications.
	PO12	3	Students will be able to have lifelong learning with technological changes in transformers.
EET202.5	**PSO1**	2	Students will be able to apply the engineering knowledge to describe the constructional details and modes of operation of single phase and three phase transformers.
	PSO2	2	Students will be able to derive solutions to problems related to single phase and three phase transformers.
	PO1	3	Students will be able to describe performance of transformers under various conditions.
	PO6	2	Students will be able to apply reasoning for the selection of appropriate transformers based on the performance of transformers.
	PO12	3	Students will be able to have lifelong learning with technological changes in performance of transformers under various conditions.
EET202.6	**PSO1**	2	Students will be able to apply the engineering knowledge to assess the performance of transformers under various conditions.
	PSO2	2	Students will be able to derive solutions to problems related to the operation and performance of transformers under various conditions.

EEL 202	ELECTRICAL MACHINES LAB - 1	L	T	P	CREDIT	Year of Introduction
		0	0	3	2	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EEL202.1	Analyse the performance of DC motors and DC generators by performing load test.	K4
EEL202.2	Sketch the Open Circuit Characteristics of a self excited DC shunt generator and check conditions of voltage build up by performing suitable experiment.	K3
EEL202.3	Develop equivalent circuit and predetermine their regulation and efficiency by performing OC & SC tests on transformer.	K4
EEL202.4	Analyse the efficiency and regulation of the transformer by performingload test.	K4
EEL202.5	Analyse the efficiency of a DC machine when working as motor and generator by conducting suitable test.	K4
EEL202.6	Examine the efficiency by performing Sumpner's test on two similar transformers.	K3

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEL202.1	3	3	2	2					3	2		3			
EEL202.2	3	3	2	2					3	2		3			
EEL202.3	3	3	2	2					3	2		3	2	2	1

EEL202.4	3	3	2	2					3	2		3	2	2	1
EEL202.5	3	3	2	2					3	2		3			
EEL202.6	3	3	2	2					3	2		3	1		
Average	**3**	**3**	**2**	**2**					**3**	**2**		**3**	**0.83**	**0.67**	**0.33**

JUSTIFICATION

CO	PO/ PSO	Mapping	Justification
EEL202.1	PO1	3	Students will be able to apply the knowledge of DC motors and DC generators to predict their performance.
	PO2	3	Students will be able to analyse the performance of dc generators and motors by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	2	Students will be able to design system components based on the performance of dc generators and motors.
	PO4	2	Students will be able to provide valid conclusions regarding complex engineering based problems on the characteristics of machines.
	PO9	3	Student will be able to work as a team and function effectively in multidisciplinary environments.
	PO10	2	Students will be able to communicate effectively on complex engineering activities on DC machines with the engineering community.
	PO12	3	Students will be able to have lifelong learning with technological changes in DC machines.
EEL202.2	PO1	3	Students will be able to apply the knowledge of characteristics of DC generators to predict their performance.
	PO2	3	Students will be able to analyse the performance of dc generators by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	2	Students will be able to design system components based on the performance of dc generators.
	PO4	2	Students will be able to provide valid conclusions regarding complex engineering based problems on the characteristics of DC generators.
	PO9	3	Student will be able to work as a team and function effectively in multidisciplinary environments.
	PO10	2	Students will be able to communicate effectively on complex engineering activities on DC generators with the engineering community.

	PO12	3	Students will be able to have lifelong learning with technological changes in DC generators.
EEL202.3	PO1	3	Students will be able to apply the knowledge for predetermination of voltage regulation and efficiency of transformers to predicttheir performance.
	PO2	3	Students will be able to analyse the voltage regulation and efficiency of transformers by predetermination using principles of mathematics, natural sciences, and engineering sciences.
	PO3	2	Students will be able to design system components based on the voltage regulation and efficiency of transformers.
	PO4	**2**	Students will be able to provide valid conclusions regarding complex engineering based problems on voltage regulation and efficiency of transformers.
	PO9	**3**	Student will be able to work as a team and function effectively in multidisciplinary environments.
	PO10	**2**	Students will be able to communicate effectively on complex engineering activities on voltage regulation and efficiency of transformers with the engineering community.
	PO12	**3**	Students will be able to have lifelong learning with technological changes in improvement of voltage regulation and efficiency of transformers.
	PSO1	**2**	Students will be able to apply the engineering knowledge on voltage regulation and efficiency of transformers to predict their performance.
	PSO2	**2**	Students will be able to derive solutions to problems related to voltage regulation and efficiency of transformers.
	PSO3	**1**	Students will be able to have lifelong learning so as to adapt to dynamic changes in voltageregulation and efficiency of transformers.
EEL202.4	**PO1**	**3**	Students will be able to apply the knowledge for determination of voltage regulation and efficiency of transformers to predict their performance.
	PO2	**3**	Students will be able to analyse the voltage regulation and efficiency of transformers by determination using principles of mathematics, natural sciences, and engineering sciences.
	PO3	**2**	Students will be able to design system components based on the voltage regulation and efficiency of transformers.
	PO4	**2**	Students will be able to provide valid conclusions regarding complex engineering based problems on voltage regulation and efficiency of transformers.
	PO9	**3**	Student will be able to work as a team and function effectively in multidisciplinary environments.

	PO10	**2**	Students will be able to communicate effectively on complex engineering activities on voltage regulation and efficiency of transformers with the engineering community.
	PO12	**3**	Students will be able to have lifelong learning with technological changes in improvement of voltage regulation and efficiency of transformers.
	PSO1	**2**	Students will be able to apply the engineering knowledge on determination of voltage regulation and efficiency of transformers.
	PSO2	**2**	Students will be able to derive solutions to problems related to determination of voltageregulation and efficiency of transformers.
	PSO3	**1**	Students will be able to have lifelong learning so as to adapt to dynamic changes in voltageregulation and efficiency of transformers.
	PO1	**3**	Students will be able to apply the knowledge of DC machines operating as generator and motor to predict their performance.
	PO2	**3**	Students will be able to analyse the performance of dc machines operating as generator and motor by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	**2**	Students will be able to design system components based on the performance of dc machines operating as generator and motor.
EEL202.5	**PO4**	**2**	Students will be able to provide valid conclusions regarding complex engineering based problems on the characteristics of DC machines operating as generator and motor.
	PO9	**3**	Student will be able to work as a team and function effectively in multidisciplinary environments.
	PO10	**2**	Students will be able to communicate effectively on complex engineering activities on DC generators and motors with the engineering community.
	PO12	**3**	Students will be able to have lifelong learning with technological changes in DC generators and motors.
	PO1	**3**	Students will be able to apply the knowledge for examining efficiency of transformers to predict their performance.
	PO2	**3**	Students will be able to analyse the efficiency of two similar transformers by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	**2**	Students will be able to design system components based on the efficiency of transformers.
	PO4	**2**	Students will be able to provide valid conclusions regarding complex engineering based problems on efficiency of transformers.
	PO9	**3**	Student will be able to work as a team and function effectively in

			multidisciplinary environments.
EEL202.6	**PO10**	**2**	Students will be able to communicate effectively on complex engineering activities on efficiency of transformers with the engineering community.
	PO12	**3**	Students will be able to have lifelong learning with technological changes in improvement of efficiency of transformers.
	PSO1	**1**	Students will be able to apply the engineering knowledge on efficiency of transformers to predict their performance.

EST 200	**DESIGN & ENGINEERING**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		2	0	0	2	2019

COURSE OUTCOMES

COs	**Description**	**Knowledge Level**
1	Explain the different concepts and principals involved in design engineering.	Remember, Understand (Level 1 & 2) k2
2	Apply design thinking while learning and practicing engineering. Develop innovative, reliable, sustainable and economically viable	Apply (Level 3) K3
3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering	Apply (Level 3) K3

MAPPING

CO – PO Matrix														
COs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	2	1					1			1				
CO2		2				1		1				2		
CO3			2			1	1		2			1		

JUSTIFICATION

	LEVEL	Justification
CO 1-PO1	2	Students will be able to apply the concepts and principles of design engineering.
CO 1-PO2	1	Students will be able to analyze and design complex engineering problems.
CO1 -PO7	1	Students will be able to understand the impact of engineering designs in societal and environmental contexts.
CO1 -PO10	1	Students will be able to communicate the designs effectively to the engineering community and society at large.

Signed By:Devassia V P
Date:14.09.2023 19:21

CO2 -PO10	2	Students will be able to analyze and design complex engineering problems by applying a design thinking approach.
CO2 -PO6	1	Students will be able to apply a design thinking approach considering the societal, health, safety, legal, and cultural issues.
CO2 -PO8	1	Students will be able to apply a design thinking approach while adhering to ethics and professional responsibility.
CO2 -PO12	2	Students will be able to recognize the need for & engage in independent and life-long learning in the context of technological change.
CO3 -PO 3	2	Students will be able to design and develop innovative products in the computer science area to meet societal needs and thereby emerge as eminent researchers and entrepreneurs.
CO3 -PO 6	1	Students will be able to develop designs considering the societal, health, safety, legal, and cultural issues.
CO3 -PO 7	1	Students will be able to develop designs, understanding the impact of engineering designs in societal and environmental contexts.
CO3 -PO 9	2	Students will function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings while developing innovative designs.

Signed By:Devassia V P
Date:14.09.2023 19:21

CO3 -PO 10	2	Students will be able to communicate the designs they develop effectively to the engineering community and society at large.
CO3 -PO 12	1	Students will be able to recognize the need for & engage in independent and life-long learning in the context of technological change while involving design and development.

5

EET 307	SYNCHRONOUS AND INDUCTION MACHINES	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET307.1	Analyse the performance of different types of alternators.	K3
EET307.2	Analyse the performance of a synchronous motor.	K3
EET307.3	Analyse the performance of different types of induction motors.	K3
EET307.4	Describe operating principle of induction machine as generator.	K2
EET307.5	Explain the types of single phase induction motors and their working principle.	K2

MAPPING

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
EET307.1	2	2				2						2	2	1	
EET307.2	3	3	2			2						2	1	1	
EET307.3	3	3	2			2						2	2	1	
EET307.4	3	3	2			2						2	2	1	
EET307.5	2	2				2						2	2	1	
Average	**2.6**	**2.6**	**1.2**			**2**						**2**	**1.8**	**1**	

Signed By:Devassia V P
Date:14.09.2023 19:21

JUSTIFICATION

CO	PO/ PSO	Mapping	Justification
EET307.1	PO1	2	Students will be able to describe the performance of different types of alternators.
	PO2	2	Students will be able to analyse the alternators using the performance characteristics.
	PO6	2	Students will be able to apply reasoning based on performance of alternators for the responsibilities relevant to the professional engineering practice.
	PO12	2	Students will be able to have lifelong learning with technological changes in performance of different types of alternators.
	PSO1	2	Students will be able to apply the engineering knowledge on performance of different types of alternators.
	PSO2	1	Students will be able to derive solutions to problems related to the operation and performance of different types of alternators at various conditions.
EET307.2	PO1	3	Students will be able to describe the performance of synchronous motor.
	PO2	3	Students will be able to analyse the synchronous motor using the performance characteristics.
	PO3	2	Students will be able to design system components based on the performance of synchronous motor.
	PO6	2	Students will be able to apply reasoning based on performance of synchronous motor for the responsibilities relevant to the professional engineering practice.
	PO12	2	Students will be able to have lifelong learning with technological changes in performance of synchronous motor.
	PSO1	1	Students will be able to apply the engineering knowledge on performance of synchronous motor.
	PSO2	1	Students will be able to derive solutions to problems related to the operation and performance of synchronous motor at various conditions.
EET307.3	PO1	3	Students will be able to describe the performance of different types of induction motors.
	PO2	3	Students will be able to analyse different types of induction motors using the performance characteristics.
	PO3	2	Students will be able to design system components based on the performance of different types of induction motors.
	PO6	2	Students will be able to apply reasoning based on performance of different types of induction motors for the responsibilities relevant to the professional engineering practice.

Signed By:Devassia V P
Date:14.09.2023 19:21

	PO12	2	Students will be able to have lifelong learning with technological changes in performance of different types of induction motors.

	PSO1	2	Students will be able to apply the engineering knowledge on performance of different types of induction motors.
	PSO2	1	Students will be able to derive solutions to problems related to the operation and performance of different types of induction motors at various conditions.
EET307.4	PO1	3	Students will be able to describe the operating principle of induction machine as generator.
	PO2	3	Students will be able to analyse the operation of induction machine as generator.
	PO3	2	Students will be able to design system components based on the operation of induction machine as generator.
	PO6	2	Students will be able to apply reasoning based on operation of induction machine as generator for the responsibilities relevant to the professional engineering practice.
	PO12	2	Students will be able to have lifelong learning with technological changes in operation of induction machine as generator.
	PSO1	2	Students will be able to apply the engineering knowledge on operation of induction machine as generator.
	PSO2	1	Students will be able to derive solutions to problems related to the operation of induction machine as generator at various conditions.
EET307.5	PO1	2	Students will be able to describe the types of single phase induction motors and their working principle.
	PO2	2	Students will be able to analyse the operation of single phase induction motors.
	PO6	2	Students will be able to apply reasoning based on operation of different types of single phase induction motors for the responsibilities relevant to the professional engineering practice.
	PO12	2	Students will be able to have lifelong learning with technological changes in operation of single phase induction motors.
	PSO1	2	Students will be able to apply the engineering knowledge on operation of single phase induction motors.
	PSO2	1	Students will be able to derive solutions to problems related to the operation of single phase induction motors at various conditions.

EEL 333	ELECTRICAL MACHINESLAB-II	L	T	P	CREDIT	Year of Introduction
		0	0	3	2	2019

COURSE OUTCOMES

EEL333.1	Analyse the performance of single phase and three phase induction motors by conducting suitable tests.	K4
EEL333.2	Analyse the performance of three phase synchronous machine from V and inverted V curves.	K4
EEL333.3	Analyse the performance of a three phase alternator by conducting suitable tests.	K4

MAPPING

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
EEL333.1	3	3	2	2					3	2		3	2	2	1
EEL333.2	3	3	2	2					3	2		3	2		
EEL333.3	3	3	2	2					3	2		3	2	2	1
Average	**3**	**3**	**2**	**2**					**3**	**2**		**3**	**2**	**1.33**	**0.67**

JUSTIFICATION

CO	PO/ PSO	Mapping	Justification
EEL333.1	PO1	3	Students will be able to apply the knowledge of single phase and three phase induction motors to predict their performance.
	PO2	3	Students will be able to analyse the performance of single phase and three phase induction motors by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	2	Students will be able to design system components based on the performance of single phase and three phase induction motors.
	PO4	2	Students will be able to provide valid conclusions regarding complex engineering based problems on the characteristics of single phase and three phase induction motors.
	PO9	3	Student will be able to work as a team and function effectively in multidisciplinary environments.
	PO10	2	Students will be able to communicate effectively on complex engineering activities on single phase and three phase induction motors with the engineering community.
	PO12	3	Students will be able to have lifelong learning with technological changes in single phase and three phase induction motors.
	PSO1	2	Students will be able to apply the engineering knowledge on single phase and three phase induction motors.
	PSO2	2	Students will be able to derive solutions to problems related to single phase and three phase induction motors.
	PSO3	1	Students will be able to have lifelong learning so as to adapt to dynamic changes in performance of single phase and three phase induction motors.
EEL333.2	PO1	3	Students will be able to apply the knowledge of three phase synchronous machine to predict their performance.
	PO2	3	Students will be able to analyse the performance of three phase synchronous machine by using V curve.
	PO3	2	Students will be able to design system components based on the performance of three phase synchronous machine.
	PO4	2	Students will be able to provide valid conclusions regarding reactive power compensation based on the V-curve of three phase synchronous machine.
	PO9	3	Student will be able to work as a team and function effectively in multidisciplinary environments.

EEL333.3	PO10	2	Students will be able to communicate effectively on complex engineering activities on three phase synchronous machine with the engineering community.
	PO12	3	Students will be able to have lifelong learning with technological changes in three phase synchronous machine.
	PSO1	2	Students will be able to apply the engineering knowledge for analyzing the performance of performance of three phase synchronous machine based on Vcurve.
	PO1	3	Students will be able to apply the knowledge of three phase alternator to predict the performance.
	PO2	3	Students will be able to analyse the performance of three phase alternator.
	PO3	2	Students will be able to design system components based on the performance of three phase alternator.
	PO4	2	Students will be able to provide valid conclusions regarding reactive power compensation based on various tests on three phase alternator.
	PO9	3	Student will be able to work as a team and function effectively in multidisciplinary environments.
	PO10	2	Students will be able to communicate effectively on complex engineering activities on three phase alternator with the engineering community.
	PO12	3	Students will be able to have lifelong learning with technological changes in three phase alternator.
	PSO1	2	Students will be able to apply the engineering knowledge for analyzing the performance of a three phase alternator by conducting suitable tests.
	PSO2	2	Students will be able to derive solutions to problems related to the performance of a three phase alternator.
	PSO3	1	Students will be able to have lifelong learning so as to adapt to dynamic changes in the performance of a three phase alternator.

EET 305	SIGNALS AND SYSTEMS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

No.	Course outcomes	Knowledge Level
CO 1	Apply properties of signals and systems to classify them	**K2**
CO 2	Apply fourier series and fourier transform concepts for continuous time signals	**K3**
CO 3	Analyze continuous time system with Laplace transform	**K4**
CO 4	Analyze discrete time system with Z transform	**K4**
CO 5	Apply fourier series and fourier transform concepts for discrete time systems.	**K3**
CO6	Describe the concept of stability of continuous time system and sampled data system.	**K2**

MAAPING

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

JUSTIFICATION

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	3	Knowledge in properties of signals and systems will help to solve many engineering problems.
CO 1 – PO2	3	Knowledge in properties of signals and systems will help to identify and formulate engineering problems.
CO 1 – PO5	2	Opertions of signal can be studied in modern tools like MATH lab
CO1 – PO12	1	Fundamental knowledge in properties of signals and systems is used in context of technological change.
CO1 – PSO1	3	Knowledge in operations on various signals and systems will help in the design, analysis and development of various electrical systems
CO2 – PO1	3	Fundamental knowledge in Fourier series, Fourier transforms (CT system) can be applied to the solution of various engineering problems.
CO2 – PO2	3	Knowledge in Fourier series, Fourier transforms(CT system) will help to formulate and analyze complex engineering problems.
CO2 – PO3	3	Knowledge in various series and transforms(CT system) can be applied to the development of solution for complex engineering problems.
CO2 – PO12	1	Knowledge in Fourier series, Fourier transforms(CT system) will help in context of technological change.
CO2 – PSO1	3	Knowledge in Fourier series, Fourier transforms(CT system) will help in the design, analysis and development of various electrical systems.
CO3 – PO1	3	Fundamental knowledge in Laplace transforms can be applied to the solution of various engineering problems.
CO3 – PO2	3	Knowledge in LT will help to formulate and analyze complex engineering problems.
CO3 – PO3	3	Knowledge in LT can be applied to the development of solution for complex engineering problems.
CO3 – PO5	2	Knowledge of LT can be simulated by modern tools like MATH lab etc

CO3 – PO12	2	Knowledge in LT will help to recognize the need for technological change.
CO3 – PSO1	3	Knowledge in LT will help in the design, analysis and maintain various types of electrical systems and challenges in the field.
CO4 – PO1	3	Knowledge in Z transform will help to design the LTI system.
CO4 – PO2	3	Knowledge in the Discrete time system with Z transform will help to formulate and analyze complex engineering problems.
CO4 – PO3	3	Knowledge in Z transform can be applied to the development of solution for complex engineering problems.
CO4 – PO5	2	Knowledge of Z transform can be simulated by modern tools like MATH lab
CO4 – PO12	2	Knowledge in Z transform will help to recognize the need for technological change.
CO4 – PSO1	3	Knowledge in Z transform will help in the design, analysis and development of various electrical systems.
CO5 – PO1	3	Knowledge in Fourier series and Fourier transform concepts in DT systems can be applied to the solution of complex engineering problems.
CO5 – PO2	3	Knowledge in Fourier series and Fourier transform concepts in DT systems will help to identify and formulate complex engineering problems.
CO5 – PO3	3	Knowledge in Fourier series and Fourier transform concept in DT systems will help to design solutions for complex engineering problems.
CO5 – PO12	2	Knowledge in fourier series and fourier transform will help to recognize the need for technological change.
CO5 – PSO1	3	Knowledge in FS and FT transform will help in the design, analysis and development of various electrical systems.
CO6– PO1	3	Knowledge in sampling theorem can be applied to design a reliable digital signal processing system.
CO56– PO2	3	Knowledge in sampling theorem can be used to formulate a reliable digital signal processing system.
CO6 – PO5	2	Knowledge in sampling theorem can be simulated by modern tools like matlab etc
CO6 – PO12	1	Knowledge in sampled data systems and stability concepts will help to recognize the need for technological change.
CO6– PSO1	3	Knowledge in sampling theorem will help in the design and development of a reliable digital signal processing system.

Signed By:Devassia V P
Date:14.09.2023 19:21

EET 303	MICROPROCESSORS AND CONTROLLERS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET303.1	Describe the architecture and timing diagram of 8085 microprocessor.	K2
EET303.2	Develop assembly language programs in 8085 microprocessor.	K3
EET303.3	Identify the different ways of interfacing memory and I/O with 8085 microprocessor.	K2
EET303.4	Understand the architecture of 8051 microcontroller and embedded systems.	K2
EET303.5	Develop assembly level and embedded C programs in 8051 microcontroller.	K3

MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2											1	-	-
CO2	3	2	3	2	1								2	2	1
CO3	3	2	2	2	2								3	3	1
CO4	3	2											1	-	-
CO5	3	2	3	2	1	1						1	2	2	1
AVG	3	2	3	2	1	1	-	-	-	-	-	1	2	2	1

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
EET303.1-PO1	3	Apply the knowledge of architecture and timing diagram of 8085 microprocessor for the solutionof complex engineering problems.
EET303.1-PO2	2	Apply the knowledge of timing diagram of 8085 microprocessor to analyze engineering problemsreaching conclusions.
EET303.1-PSO1	1	Utilize the knowledge of the architecture and timing diagram of the 8085 microprocessor to design, commission, and maintain a variety of electrical systems in the field.
EET303.2-PO1	3	Develop assembly language programs in 8085 microprocessor for the solution of complex engineering problems.
EET303.2-PO2	2	Develop assembly language programs in 8085 microprocessor to analyze engineering problemsreaching conclusions.
EET303.2-PO3	3	Knowledge gained from development of assembly language programs in 8085 microprocessor canbe used for design/development of solutions.
EET303.2-PO4	2	Conduct investigations of complex problems by developing assembly language programs in 8085microprocessor.
EET303.2-PO5	1	Modern tool usage is used in developing assembly language programs in 8085 microprocessor.
EET303.2-PSO1	2	Utilize the knowledge of assembly language programs in 8085 microprocessor to design, commission, and maintain a variety of electrical systems in the field.
EET303.2-PSO2	2	Develop sustainable solutions to complex electrical engineering problems by assembly language programs in 8085 microprocessor.

EET303.2-PSO3	1	Adapt to changing work cultures by learning assembly language programs in the 8085microprocessor on a lifelong basis.
EET303.3-PO1	3	Apply different ways of interfacing memory and I/O with 8085 microprocessor for the solution ofcomplex engineering problems.
EET303.3-PO2	2	Develop different ways of interfacing memory and I/O with 8085 microprocessor to analyzeengineering problems reaching conclusions.
EET303.3-PO3	2	Knowledge gained from different ways of interfacing memory and I/O with 8085 microprocessor can be used for design/development of solutions.
EET303.3-PO4	2	Conduct investigations of complex problems by developing different ways of interfacing memory and I/O with 8085 microprocessor.
EET303.3-PO5	2	Modern tool usage is used in different ways of interfacing memory and I/O with 8085 microprocessor.
EET303.3-PSO1	3	Utilize the knowledge of different ways of interfacing memory and I/O with 8085 microprocessor, to design, commission, and maintain a variety of electrical systems in the field.
EET303.3-PSO2	3	Develop sustainable solutions to complex electrical engineering problems by interfacing memory and I/O with 8085 microprocessor.
EET303.3-PSO3	1	Adapt to changing work cultures by learning memory interfacing programs in the 8085 microprocessor on a lifelong basis.
EET303.4-PO1	3	Apply the architecture of 8051 microcontroller and embedded systems for the solution of complex engineering problems.
EET303.4-PO2	2	To analyze engineering problems and reaching conclusions by utilizing the architecture of 8051 microcontroller and embedded systems..

EET303.4-PSO1	1	Utilize the knowledge of the architecture of 8051 microcontroller and embedded systems., to design, commission, and maintain a variety of electrical systems in the field.
EET303.5-PO1	3	Develop assembly level and embedded C programs in 8051 microcontroller for the solution of complex engineering problems.
EET303.5-PO2	2	Develop assembly level and embedded C programs in 8051 microcontroller to analyze engineering problems reaching conclusions.
EET303.5-PO3	3	Knowledge gained from development assembly level and embedded C programs in 8051 microcontroller can be used for design/development of solutions.
EET303.5-PO4	2	Conduct investigations on complex problems by developing assembly level and embedded C programs in 8051 microcontroller.
EET303.5-PO5	1	Modern tool usage is used in developing assembly level and embedded C programs in 8051 microcontroller.
EET303.5-PO6	1	Apply assembly level and embedded C programs in 8051 microcontroller to assess societal, health, safety issues relevant to the professional engineering practice.
EET303.5-PO12	1	Ability to engage in independent and life-long learning by developing assembly level and embedded C programs.
EET303.5-PSO1	2	Utilize the knowledge of assembly level and embedded C programs to design, commission, and maintain a variety of electrical systems in the field.
EET303.5-PSO2	2	Develop sustainable solutions to complex electrical engineering problems by assembly level and embedded C programs of 8051 microcontroller
EET303.5-PSO3	1	Adapt to changing work cultures by learning assembly level and embedded C programs of 8051 microcontroller on a lifelong basis.

Signed By:Devassia V P
Date:14.09.2023 19:21

EET 301	POWER SYSTEMS 1	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

1	Identify the power generating system appropriate for a given area.
2	Evaluate the electrical performance of any transmission line.
3	Compute various physical characteristics of underground and overhead transmission systems.
4	Select appropriate switchgear for protection schemes
5	Design a simple electrical distribution system as per the standards.

MAPPING

EET 301 Power Systems I															
	PO.1	PO.2	PO .3	PO .4	PO .5	PO .6	PO .7	PO .8	PO .9	PO .10	PO .11	PO .12	PSO .1	PSO .2	PSO .3
CO1	3					2		2			1	2	1	1	1
CO2	3	3											1		
CO3	3	2				2	2	2					1		1
CO4	3	1				2		2				1	1		1
CO5	3	1				2	2	2			1	2	1	1	1

Signed By:Devassia V P
Date:14.09.2023 19:21

JUSTIFICATION

Justification of mapping	
CO1	Able to apply the knowledge of mathematics and electrical engineering fundamentals to identify the power generating system appropriate for agiven area.(PO1) Able to apply reasoning informed by the contextual knowledge in electrical engineering to assess societal, safety and the consequent responsibilities relevant to the professional electrical engineering practice (PO6) Apply ethical principles and commit to professional ethics and responsibilities and norms of the electrical engineering while selecting an area for power generation(PO8) Able to demonstrate knowledge and understanding of the power engineering and be able to apply these to manage their power system related projects (PO11) Recognize the need for and have the ability to engage in life-long learning in the area of power system(PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) in the area of power system
CO2	Able to have knowledge about the electrical performance of transmission line(PO1) Able to analyse the different transmission line parameters(PO2) Apply knowledge about the electrical performance of transmission line for selecting suitable transmission line circuits in power system (PSO1)

CO3	Able to have knowledge about physical characteristics of underground and overhead transmission systems (PO1)
	Able to analyse the characteristics of various overhead and underground transmission systems(PO2) Able to apply reasoning informed by the contextual knowledge in various transmission systems to assess societal, safety and the consequent responsibilities relevant to the professional electrical engineering practice (PO6) Able to understand the impact of the power engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development of transmission systems (PO7) Apply ethical principles and commit to professional ethics and responsibilities and norms of the electrical engineering while selecting proper transmission system (PO8) Apply knowledge(PSO1)and empower students for lifelong learning (PSO3) in the area of power system
CO4	Able to have knowledge about power system protection (PO1) Able to analyse the characteristics of various switchgear for protection schemes (PO2) Able to apply reasoning informed by the contextual knowledge in various switchgear protection schemes to assess safety issues and the consequent responsibilities relevant to the electrical engineering practice (PO6) Apply ethical principles and commit to professional ethics and responsibilities and norms of the electrical engineering while selecting proper switchgear for protection schemes (PO8)

	Recognize the need for and have the ability to engage in life-long learning in the power system protection (PO12) Apply knowledge(PSO1)and empower students for lifelong learning (PSO3) in the area of switchgear protection.
CO5	Able to apply the knowledge of mathematics and electrical engineering fundamentals to design a simple electrical distribution system as per the standards. (PO1) Able to design and analyse a simple electrical distribution system (PO2) Able to apply reasoning informed by the contextual knowledge in power engineering to assess societal, safety and the consequent responsibilities relevant to the development of a simple electrical distribution system (PO6) Able to understand the impact of the electrical engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development in the area of designing electrical distribution system. (PO7) Apply ethical principles and commit to professional ethics and responsibilities and norms of the electrical engineering while designing an electrical distribution system (PO8) Able to demonstrate knowledge and understanding of the power engineering and be able to apply these while designing an electrical distribution system (PO11) Recognize the need for, and have the preparation and ability to engage in life-long learning in the area of electrical distribution system design (PO12) Apply knowledge (PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) in the area of electrical distribution system design

HUT 310	MANAGEMENT FOR ENGINEERS	L	T	P	CREDIT	Year of Introduction
		3	0	0	3	2019

COURSE OUTCOMES

CO	Course outcome	Knowledg elevel
HUT310.1	Explain the characteristics of management in the contemporary context.	K2
HUT310.2	Describe the functions of management.	K2
HUT310.3	Demonstrate ability in decision making process and productivity analysis.	K2
HUT310.4	Illustrate project management technique and develop a project schedule.	K3
HUT310.5	Summarize the functional areas of management.	K2
HUT310.6	Comprehend the concept of entrepreneurship and create business plans.	K2

MAPPING

PO / CO	Programme outcomes												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	1	2	2	2	-	2	1	1	-	-
CO2	2	-	-	-	1	1	-	2	1	2	1	1	-	-
CO3	2	2	2	2	1	-	-	-	-	-	-	-	-	-
CO4	2	2	2	2	1	-	-	-	-	-	2	1	-	-
CO5	2	-	-	-	-	1	1	-	1	2	1	-	-	-
CO6	-	2	2	2	1	1	1	1	1	1	1	1	-	-
AVG	2	2	2	2	1	1.25	1.33	1.66	1	1.75	1.2	1	-	-

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
HUT310.1-PO1	2	Understanding the characteristics of management, students are expected to applythe engineering knowledge in order to become astounding professional managers in an organization.
HUT310.1-PO5	1	With the knowledge gained from the characteristics of management, students are expected to use modern tools with respectiveto the scenario they confront for enhancing the managerial roles.
HUT310.1-PO6	2	After the completion of course, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.1-PO7	2	Understanding the characteristics of management, students are expected to work as dedicated managers for the sustainable growth and the protection of the environment.
HUT310.1-PO8	2	With the knowledge gained from the characteristics of management, students are expected to portray ethical values like integrity, transparency, accountability, impartiality and equity which are inevitable for the organizational growth.
HUT310.1-PO10	2	After the completion of course, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.1-PO11	1	Understanding the characteristics of management, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.1-PO12	1	With the knowledge gained from the characteristics of management, students are expected to acquire the significance and principles of management for personal and professional growth.

HUT310.2-PO1	2	Understanding the functions of management, students are expected to apply the engineering knowledge in order to become astounding professional managers in an organization.
HUT310.2-PO5	1	With the knowledge gained from the functions of management, students are expected to use modern tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.2-PO6	1	Understanding the functions of management, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.2-PO8	2	With the knowledge gained from the functions of management, students are expected to portray ethical values like integrity, transparency, accountability, impartiality and equity which are inevitable for the organizational growth.
HUT310.2-PO9	1	Understanding the functions of management, students are expected to work both individually and team for the betterment of the organization irrespective of the gender.
HUT310.2-PO10	2	With the knowledge gained from the functions of management, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.2-PO11	1	After the completion of course, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.2-PO12	1	Understanding the functions of management, students are expected to acquire the significance and principles of management for personal and professional growth.
HUT310.3-PO1	2	Understanding the decision-making process and productivity analysis, students are expected to apply the engineering knowledge in order to become astounding professional managers in an organization.
HUT310.3-PO2	2	With the knowledge gained from the decision-making process and productivity analysis, students are expected to analyze both simple and crucial problems confronted by the employee in an organization as well as the

		organization as a whole.
HUT310.3-PO3	2	Understanding the decision-making process and productivity analysis, students are expected to
		develop proper and timely solutions to each and every problem for the smooth functioning of an organization.
HUT310.3-PO4	2	With the knowledge gained from the decision-making process and productivity analysis, students are expected to conduct precise investigations of complex problems in order to address it appropriately for the advancement of an organization.
HUT310.3-PO5	1	Understanding the decision-making process and productivity analysis, students are expected to use modern tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.4-PO1	2	With the knowledge gained from the project management technique, students are expected to apply the engineering knowledge in order to become astounding managers in an organization.
HUT310.4-PO2	2	Understanding the project management technique, students are expected to analyze both simple and crucial problems confronted by the employee in an organization as well as the organization as a whole.
HUT310.4-PO3	2	With the knowledge gained from the project management technique, students are expected to develop proper and timely solutions to each and every problem for the smooth functioning of an organization.
HUT310.4-PO4	2	Understanding the project management technique, students are expected to conduct precise investigations of complex problems in order to address it appropriately for the advancement of an organization.

HUT310.4-PO5	1	After the completion of course, students are expected to use modern tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.4-PO11	2	With the knowledge gained from the project management technique, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.4-PO12	1	Understanding the project management technique, students are expected to acquire the significance and principles of management for personal and professional growth.
HUT310.5-PO1	2	With the knowledge gained from the functional areas of management, students are expected to apply the engineering knowledge in order to become astounding professional managers in an organization.
HUT310.5-PO6	1	Understanding the functional areas of management, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.5-PO7	1	After the completion of course, students are expected to work as dedicated managers for the sustainable growth and the protection of the environment.
HUT310.5-PO9	1	With the knowledge gained from the functional areas of management, students are expected to work both individually and team for the betterment of the organization irrespective of the gender.
HUT310.5-PO10	2	Understanding the functional areas of management, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.5-PO11	1	After the completion of course, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.6-PO2	2	With the knowledge gained from the concept of entrepreneurship, students are expected to analyze both simple and crucial problems confronted by the employee in an organization as well as the organization as a whole.

HUT310.6-PO3	2	Understanding the concept of entrepreneurship, students are expected to develop proper and timely solutions to each and every problem for the smooth functioning of an organization.
HUT310.6-PO4	2	With the knowledge gained from the concept of entrepreneurship, students are expected to conduct precise investigations of complex problems in order to address it appropriately for the advancement of an organization.
HUT310.6-PO5	1	Understanding the concept of entrepreneurship, students are expected to use modern tools with respective to the scenario
		they confront for enhancing the managerial roles.
HUT310.6-PO6	1	After the completion of course, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.6-PO7	1	With the knowledge gained from the concept of entrepreneurship, students are expected to work as dedicated managers for the sustainable growth and the protection of the environment.
HUT310.6-PO8	1	Understanding the concept of entrepreneurship, students are expected to portray ethical values like integrity, transparency, accountability, impartiality and equity which are inevitable for the organizational growth.
HUT310.6-PO9	1	After the completion of course, students are expected to work both individually and team for the betterment of the organization irrespective of the gender.
HUT310.6-PO10	1	With the knowledge gained from the concept of entrepreneurship, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.6-PO11	1	Understanding the concept of entrepreneurship, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.

HUT310.6-PO12	1	After the completion of course, students are expected to acquire the significance and principles of management for personal and professional growth.

MCN 301	DISASTER MANAGEMENT	L	T	P	CREDIT	Year of Introduction
		2	0	0	-	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
MCN301.1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle	K2
MCN301.2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment	K2
MCN301.3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk.	K2
MCN301.4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community.	K3
MCN301.5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions	K2
MCN301.6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level.	K2

MAPPING

CO	Programme outcomes												PSO			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	
CO1	-	2	-	-	-	2	-	-	-	2	-	2	-	-	-	
CO2	2	3	2	-	2	2	3	-	-	3	-	2	-	-	-	
CO3	2	3	2	2	2	2	3	-	-	3	-	2	-	-	-	
CO4	3	3	3	-	2	2	3	-	-	-	-	2	-	-	-	
CO5	3	3	-	-	2	2	3	-	-	-	-	2	-	-	-	
CO6	3	-	-	-	-	2	3	3	-	-	-	2	-	-	-	
AVG	2.6	2.8	2.33	2	2	2	3	3	-	2.67	-	2	-	-	-	

JUSTIFICATION

CO-PO	LEVEL (Low/Moderate/High)	JUSTIFICATION
MCN301.CO1-PO2	M	Students can understand the various terminologies in disaster management which help them to grow professionally.
MCN301.CO1-PO6	M	Students can apply the knowledge gained to assess the disasters and take necessary measures.
MCN301.CO1-PO10	M	Students will able to help the documentation of disasters for future reference.
MCN301.CO1-PO12	M	Students can recognize the need for identification and proper management of disaster.
MCN301.CO2-PO1	M	Students can understand about hazard types andvulnerability types which help them to act

Signed By:Devassia V P
Date:14.09.2023 19:21

		as the best tool to win against disaster.
MCN301.CO2-PO2	H	Students will able to assess vulnerability whichmake them to solve disaster related problems.
MCN301.CO2-PO3	M	Students will able to develop new and sustainablemeasures to fight against disaster through vulnerability assessment.
MCN301.CO2-PO5	M	Students will able to perform hazard mapping toanalyse the characteristics of hazard.
MCN301.CO2-PO6	M	Students will able to apply the knowledge to assessthe societal, health, safety and cultural issues in the disaster management perspective.
MCN301.CO2-PO7	H	Students can apply the vulnerability assessment methodologies for the sustainable development and disaster management.
MCN301.CO2-PO10	H	Students can communicate effectively with the society and professionals to give clear instructions about hazard and vulnerability.
MCN301.CO2-PO12	M	Students will able to be updated every day aboutthe technological changes in vulnerability assessment.
MCN301.CO3-PO1	M	Students will able to apply the understanding of risk assessments in the advent of disasters.
MCN301.CO3-PO2	H	Students will able to put in appropriate methodologies to assess risk which reduce the impacts of disaster.
MCN301.CO3-PO3	M	Students will able to design solutions with the risk assessment methodologies in the disaster scenario.
MCN301.CO3-PO4	M	Students will able to apply research methods andknowledge in the analysis and interpretation of risks.
MCN301.CO3-PO5	M	Students can utilize appropriate methodologies to assess disaster risks.
MCN301.CO3-PO6	M	Students will get an awareness about the responsibilities and necessity of risk assessment.
MCN301.CO3-PO7	H	Students will able to utilize the risk assessment in

		societal and environmental context
MCN301.CO3-PO10	H	Students will able to transfer instructions efficiently regarding assessed risks and to draft reports.
MCN301.CO3-PO12	M	Students will be aware about the recent methodologies in risk assessment.
MCN301.CO4-PO1	H	Students will able to utilize the knowledge of disaster risk management to solve complex disaster related issues.
MCN301.CO4-PO2	H	Students will able to identify and analyse the problems and develop possible measures to reduce disaster risks.
MCN301.CO4-PO3	H	Students will able to apply risk assessment methodologies with the proper consideration for public health and safety.
MCN301.CO4-PO5	M	Students can utilize the idea of phases of disaster risk management and analyse its limitations.
MCN301.CO4-PO6	M	Students will able to utilize the contextual knowledge to practice professional engineering and to reduce disaster risk across sector and community.
MCN301.CO4-PO7	H	Students will able to recognize and demonstrate knowledge for disaster risk management and sustainable development.
MCN301.CO4-PO12	M	Students will able to understand the need for updation of knowledge in risk management measures.
MCN301.CO5-PO1	H	Students will able to understand the nature of disaster response and apply the knowledge to solve related problems.
MCN301.CO5-PO2	H	Students can analyse the various disaster response actions.
MCN301.CO5-PO5	M	Students will able to frame and apply disaster response actions effectively.
MCN301.CO5-PO6	M	Students will able to assess safety of the society and health issues affecting people related to the disaster scenario.
MCN301.CO5-PO7	H	Students will able to understand the effect of professional engineering solutions to take effective disaster response actions.
MCN301.CO5-PO12	M	Students will able to learn life long in the context of the changes in the various disaster response actions.

MCN301.CO6-PO1	H	Students will able to apply the knowledge of disaster management and risk reduction as solution for disaster related problems.
MCN301.CO6-PO6	M	Students will able to apply contextual knowledge of various legislations to assess societal, safety, legal and cultural issues.
MCN301.CO6-PO7	H	Students will able to practice for disaster management and risk reduction for sustainable development.
MCN301.CO6-PO8	H	Students will able to apply disaster legislations maintaining ethical principles.
MCN301.CO6-PO12	M	Students will able to recognize the need for updating knowledge of risk reduction.

EEL 331	**MICROPROCESSORS AND MICROCONTROLLERS LAB**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		0	0	3	2	2019

COURSE OUTCOMES

CO	**Course outcome**	**Knowledge level**
EEL331.1	Develop and execute assembly language programs for solving arithmetic and logical problems using microprocessor/ microcontroller.	K3
EEL331.2	Design and Implement systems with interfacing circuits for various applications.	K3
EEL331.3	Execute projects as a team using microprocessor/ microcontroller for real life applications.	K3

MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	2	3			2	2	3		2	3	3	-
CO2	3	3	2	2	3			2	2	3		2	3	3	-
CO3	3	3	3	3	3	3	3	3	3	3	2	2	1	1	-
AVG	3	3	2	2	3	3	3	2	2	3	2	2	2	2	-

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
EEL 331.1-PO1	H	In depth engineering knowledge to develop and execute assembly language programs for solving arithmetic and logical problems
EEL 331.1-PO2	H	Develop and execute assembly language programs for analyzing complex engineering problems reachingsubstantiated conclusions
EEL 331.1-PO3	M	Develop and execute assembly language programs for design solutions for complex engineering problems
EEL 331.1-PO4	M	Use research-based knowledge and research methods to develop and execute assembly language programs for solving arithmetic and logical problems
EEL 331.1-PO5	H	Develop and execute assembly language programs using modern engineering and IT tools
EEL 331.1-PO8	M	Apply ethical principles and commit to professional ethicsand responsibilities in developing assembly language programs for solving arithmetic and logical problems

Signed By:Devassia V P
Date:14.09.2023 19:21

EEL 331.1-PO9	M	Function effectively as an individual, and as a member or leader in diverse teams to develop and execute assembly language programs
EEL 331.1-PO10	H	Communicate effectively on complex engineering activities by developing assembly language programs.
EEL 331.1-PO12	M	Get ability to engage in independent and life-long learning in developing and execution of assembly language programs
EEL 331.1-PSO1	H	Apply knowledge of mathematics, science and engineeringto develop and execute assembly language programs for design, commission and maintain various types of electricalsystems
EEL 331.1-PSO2	H	Derive sustainable solutions to complex electrical engineering problems by the execution of assembly language programs
EEL 331.2-PO1	H	In depth engineering knowledge to design and Implement systems with interfacing circuits for various applications.
EEL 331.2-PO2	H	Design and Implement systems with interfacing circuits for various applications for analyzing complex engineering problems reaching substantiated conclusions
EEL 331.2-PO3	M	Design and Implement systems with interfacing circuits for design solutions for complex engineering problems
EEL 331.2-PO4	M	Use research-based knowledge and research methods to design and Implement systems with interfacing circuits for various applications.
EEL 331.2-PO5	H	Design and Implement systems with interfacing circuits using modern engineering and IT tools
EEL 331.2-PO8	M	Apply ethical principles and commit to professional ethics and responsibilities in designing and Implementing systems with interfacing circuits for various applications.
EEL 331.2-PO9	M	Function effectively as an individual, and as a member or leader in diverse teams to design and Implement interfacing circuits for various applications.
EEL 331.2-PO10	H	Communicate effectively on complex engineering activities by design and Implementing systems interfacing circuits for various applications.
EEL 331.2-	M	Get ability to engage in independent and life-long learning in designing and Implementing systems with interfacing circuits for various applications.

PO12		
EEL 331.2-PSO1	H	Apply knowledge of mathematics, science and engineering to design and Implement interfacing circuits for design, commission and maintain various types of electrical systems
EEL 331.2-PSO2	H	Derive sustainable solutions to complex electrical engineering problems by designing and Implementing interfacing circuits for various applications.
EEL 331.3-PO1	H	In depth engineering knowledge to execute projects as a team using microprocessor/ microcontroller for real life applications.
EEL 331.3-PO2	H	Develop and execute assembly language programs for executing projects as a team using microprocessor/ microcontroller for real life applications.
EEL 331.3-PO3	H	Execute projects as a team for design solutions for complex engineering problems
EEL 331.3-PO4	H	Use research-based knowledge and research methods to execute projects as a team using microprocessor/ microcontroller for real life applications.
EEL 331.3-PO5	H	Execute projects as a team using microprocessor/ microcontroller for real life applications using modern engineering and IT tools
EEL 331.3-PO6	H	Execute projects as a team for real life applications to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
EEL 331.3-PO7	H	The impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development as a team.
EEL 331.3-PO8	H	Apply ethical principles and commit to professional ethics and responsibilities in designing and Implementing projects as a team
EEL 331.3-PO9	H	Function effectively as an individual, and as a member or leader in diverse teams to design and Implement projects as a team
EEL 331.3-PO10	H	Communicate effectively on complex engineering activities by executing projects as a team

EEL 331.3-PO11	M	Get the 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.
EEL 331.3-PO12	M	Get ability to engage in independent and life-long learning in designing and Implementing systems with team work
EEL 331.3-PSO1	M	Apply knowledge of mathematics, science and engineering as a team to design, commission and maintain various types of electrical systems
EEL 331.3-PSO2	M	Derive sustainable solutions to complex electrical engineering problems with the help of team work for various applications.

6

EET 302	LINEAR CONTROL SYSTEM	L	T	P	CREDIT	Year of Introduction
		2	2	0	4	2019

COURSE OUTCOMES

CO	Statement	Knowledge level
CO1	Describe the role of various control blocks and components in feedback systems.	K2
CO2	Analyse the time domain responses of the linear systems.	K4
CO3	Apply Root locus technique to assess the performance of linear systems.	K3
CO4	Analyse the stability of the given LTI systems.	K4
CO5	Analyse the frequency domain response of the given LTI systems	K4
CO6	Design compensators using time domain and frequency domain techniques.	K5

MAPPING

EET 306	LINEAR CONTROL SYSTEMS														
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3										1	2		1
CO2	3	3	3									2	2		1
CO3	3	3	3		2							2	2		1
CO4	3	3	3									3	2		1
CO5	3	3	3		2							3	2		1
CO6	3	3	3	2								3	2		1
Average	3	3	3	2	2							2.33	2		1

JUSTIFICATION

CO	Justification
CO1	Knowledge in the basic structure is required to solve problems in engineering (PO1) To analyse the step response of first and second order systems(PO2)
	Transfer function of a different systems is a lifelong learning process (po12) Knowledge in lead, lag and lead-lag compensators (PSO1) Transfer function approach is a life- long learning (PSO3)
CO2	Knowledge of transient and steady state analysis is required to solve engineering problem (PO1) Analyse different error coefficients of different type of control systems(PO2) To analyse the steady state condition of different systems(PO3) Stability Analysis is a life- long learning process (PO12) Analyse transient performance parameters of the system for standard input function (PSO1) Stability analysis is life- long learning process (PSO3)
CO3	Knowledge of Root Locus method to determine stability problems in engineering. (PO1) Analyse the effect of addition of poles and zeros on stability (PO2) Design the compensators (Lead, Lag and Lead-Lag) using Root Locus simulation tool.(PO3) Design the PID controller and compensators using simulation tool (PO5) Controller design is life-long learning(PO12) In-depth knowledge in the stability of a system using Root Locus(PSO1) Controller design is life-long learning (PSO3)

CO4	Knowledge of Linear time invariant system stability analysis to solve an engineering problem (PO1) Analyse the stability condition of a LTI system (PO2) Design the compensators of LTI system (PO3) Stability analysis of LTI system is a life- long Process (PSO3) In-depth knowledge LTI system is required (PSO1) Stability analysis of LTI system is a life- long Process in electrical field(PSO3)
CO5	Knowledge in frequency domain analysis is necessary (PO1) Analyse the stability of a given system in frequency domain using bode/polar plots.(PO2) Interpret the data of bode plot or polar plot to analyse the stability of system (PO3) Design the bode plot using simulation tools (PO5) Engage in lifelong learning with respect to bode plot and polar plots (PO12). Acquire knowledge in the stability of a system using bode plot/polar plot(PSO1) Life –long learning to develop the frequency domain specifications of a given system(PSO3
CO5	Knowledge of designing compensators to solve the problems in electrical engineering (PO1) Analyse different compensators and controllers (PO2) Design and develop PI, PD and PID controllers (PO3) Matlab simulation analysis of the design of compensators (PO5) Life –long learning approach in the design and development of compensators (PO12) Knowledge in different stability criteria such as Nyquist, Nicholas etc., are required (PSO1) Design lead, lag and lead-lag compensators is a life-long learning (PSO3)
CO6	Knowledge of designing compensators in time domain and frequency domain is required to solve the problems in electrical engineering (PO1) Analyse different compensators in time and frequency domain(PO2) Design and develop lead, lag and lead-lag compensators in time and frequency domain (PO3) Analysis of the different compensators based on the stability (PO4) Life –long learning approach in the design and development of compensators (PO12) Knowledge in different stability criteria such as Root locus, Bode plot , Nyquist, Nicholas etc., are required (PSO1) Design lead, lag and lead-lag compensators is a life-long learning (PSO3)

EET 304	**POWER SYSTEM II**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		3	1	0	4	2019

COURSE OUTCOMES

CO1	Apply the per unit scheme for any power system network and compute the fault levels.
CO2	Analyse the voltage profile of any given power system network using iterative methods.
CO3	Analyse the steady state and transient stability of power system networks.
CO4	Model the control scheme of power systems
CO5	Schedule optimal generation scheme.

MAPPING

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

JUSTIFICATION

CO	PO	MAPPING	JUSTIFICATION
CO 1	PO1	3	Knowledge of per unit systems and faults in the system is required to solve complex engineering problems
	PO2	3	Knowledge of per unit systems and faults in the system is required for adding up problem analyzing skills
	PO 12	2	Knowledge of per unit systems and faults in the system is required to equipelectrical engineers for lifelong learning
	PSO1	2	Knowledge of per unit systems and faults in the system is required to design and maintain various systems in electrical engineering
	PS02	2	Knowledge of per unit systems and faults in the system is required to findsolutions to complex electrical engineering

Signed By:Devassia V P
Date:14.09.2023 19:21

			problems
	PSO3	2	Knowledge of per unit systems and faults in the system is required to equip electrical engineers for lifelong learning
CO 2	PO1	3	Knowledge of analyzing the voltage profile of any given power system network is required to solve complex engineering problems
	PO2	3	Knowledge of analyzing the voltage profile of any given power systemnetwork is required for adding up problem analyzing skills
	PO3	2	Knowledge of analyzing the voltage profile of any given power system network is required to design different electrical system components
	PO 12	2	Knowledge of analyzing the voltage profile of any given power systemnetwork is required to equip electrical engineers for lifelong learning
	PSO1	2	Knowledge of analyzing the voltage profile of any given power system network is required to design and maintain various systems in electrical engineering
	PS02	2	Knowledge of analyzing the voltage profile of any given power system network are required to find solutions to complex electrical engineering problems
	PSO3	2	Knowledge of analyzing the voltage profile of any given power system network is required to equip electrical engineers for lifelong learning
CO 3	PO1	3	Knowledge of analyzing the steady state and transient stability of power system networks is required to solve different operational problems inelectrical engineering
	PO2	3	Knowledge of analyzing the steady state and transient stability of power system networks is required for problem analysis in electric systems
	PO 3	2	Knowledge of analyzing the steady state and transient stability of power system networks is required to design different electrical system components
	PO 12	1	Knowledge of analyzing the steady state and transient stability of power system networks is required to equip electrical engineers for lifelong learning
	PSO1	2	Knowledge of analyzing the steady state and transient stability of power system networks is necessary to design and maintain various systems inelectrical engineering
	PS02	2	Knowledge of analyzing the steady state and transient stability of power system networks is required to find solutions to complex electrical engineering problems
	PSO3	**2**	Knowledge of analyzing the steady state and transient stability of power system networks is required to equip electrical engineers for lifelong learning

CO 4	**PO1**	**3**	Knowledge of modeling the control scheme of power systems is required to solve different operational problems in electrical engineering
	PO 2	**2**	Knowledge of modeling the control scheme of power systems is required for problem analysis in electric systems
	PSO1	**2**	Knowledge of modeling the control scheme of power systems is required to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of modeling the control scheme of power systems is required find solutions to complex electrical engineering problems
	PSO3	**2**	Knowledge of modeling the control scheme of power systems is required to equip electrical engineers for lifelong learning
CO 5	**PO1**	**3**	Knowledge of scheduling the optimal generation scheme for a power system is required to solve different operational problems in electrical engineering
	PO 2	**3**	Knowledge of scheduling the optimal generation scheme for a power system is required for problem analysis in electric systems
	PO 3	**1**	Knowledge of scheduling the optimal generation scheme for a power system is required to design different electrical system components
	PO5	**1**	Knowledge of scheduling the optimal generation scheme for a power system is required for enabling modern tool usage for electrical engineers
	PO 11	**3**	Knowledge of scheduling the optimal generation scheme for a power system is required to apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
	PO12	**2**	Knowledge of scheduling the optimal generation scheme for a power system is required to equip electrical engineers for lifelong learning
	PSO1	**2**	Knowledge of scheduling the optimal generation scheme for a power system is required to design and maintain various systems in electrical engineering
	PS02	**2**	Knowledge of scheduling the optimal generation scheme for a power system is required find solutions to complex electrical engineering problems
	PSO3	**2**	Knowledge of scheduling the optimal generation scheme for a power system is required to equip electrical engineers for lifelong learning

EET 306	POWER ELECTRONICS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

COURSE OUTCOMES

CO1	Explain the operation of modern power semiconductor devices and its characteristics.
CO2	Analyse the working of controlled rectifiers.
CO3	Explain the working of AC voltage controllers, inverters and PWM techniques.
CO4	Compare the performance of different dc-dc converters.
CO5	Describe basic drive schemes for ac and dc motors.

MAPPING

EET 306 Power Electronics														
	PO.1	PO.2	PO .3	PO .4	PO .5	PO .6	PO .7	PO .8	PO .9	PO .10	PO .11	PO .12	PSO .1	PSO .2	PSO .3
C303.1	3	1		1									1		
C303.2	3	2	1	2								2	2	1	2
C303.3	3	3											2	2	2
C303.4	3	3	2	2								2	2	2	2
C303.5	3	2										2	2	2	2

JUSTIFICATION

Justification of mapping	
CO1	An in-depth knowledge of electrical and electronics engineering (PO1) Apply the basic principles of mathematics and engineering sciences (PO2) Investigation on various modern semiconductor devices for various applications (PO4) Apply knowledge of science in the field of semiconductor device (PSO1)
CO2	An in-depth knowledge of electrical and electronics engineering (PO1) Analysis of controlled rectifier circuits using basic principles of mathematics and engineering sciences (PO2) Design and analysis of single phase and three phase controlled rectifier circuits having R, RL and RLE load (PO3, PO4) Ability to engage in lifelong learning of various controlled rectifier circuits (PO12)
	Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of controlled rectifier circuits for various applications.

3	An in-depth knowledge of electrical and electronics engineering (PO1) Analysis of AC voltage controllers and inverters using basic principles of mathematics and engineering sciences (PO2) Apply knowledge (PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of AC voltage controllers, single phase and three phase inverters for various applications.
4	An in-depth knowledge of electrical and electronics engineering (PO1) Analysis of Buck, Boost, Buck-Boost converter circuits using basic principles of mathematics and engineering sciences (PO2) Design & Analysis of Buck, Boost, Buck-Boost converter circuits in continuous conduction mode (PO3, PO4) Ability to engage in lifelong learning of different DC-DC converters for different applications (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of different DC-DC converters for various applications
5	An in-depth knowledge of electrical engineering (PO1) Analysis of various DC and AC motor drives (PO2) Ability to engage in lifelong learning of various DC and AC motor drives (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of motor drives for various applications.

EEL 332	POWER SYSTEMS LAB	L	T	P	CREDIT	Year of Introduction
		0	0	3	2	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EEL332.1	Develop mathematical models and conduct steady state and transient analysis of power system networks using standard software.	K3
EEL332.2	Develop a frequency domain model of power system networks and conduct the stability analysis.	K3
EEL332.3	Conduct appropriate tests for any power system component as perstandards.	K3
EEL332.4	Conduct site inspection and evaluate performance ratio of solar power plant.	K3

MAPPING

PO CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	3			3	2	3		3	2	2	2
CO2	3	2	1	3	3			1	2	3		2	2	2	2
CO3	3	1	1	3	3	3	1	3	3	3		3	2	2	2
CO4	3	1	1	3	3	3	3	3	3	3	2	3	2	2	2

JUSTIFICATION

CO	PO	MAPPING	JUSTIFICATION
CO 1	PO1	3	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to solve complexengineering problems
	PO2	3	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required for adding upproblem analyzing skills
	PO 3	2	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to design different electrical system components
	PO 4	3	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to conductinvestigations or research of complex problems
	PO 5	3	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to familiarizewith modern tool usage
	PO 8	3	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks using standards is requiredto apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO 9	2	Knowledge and practice of developing mathematical models and conduct steady state and transient analysis of power system networks makes theengineers to work individually and in a team
	PO 10	3	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks makes the engineer able tocomprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
	PO 12	3	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to equip electrical engineers for lifelong learning
	PSO1	2	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to

			design andmaintain various systems in electrical engineering
	PS02	2	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to find solutionsto complex electrical engineering problems
	PSO3	2	Knowledge of developing mathematical models and conduct steady state and transient analysis of power system networks is required to equip electrical engineers for lifelong learning
CO 2	PO1	3	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to solve complexengineering problems
	PO2	2	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required for adding up problem analyzing skills
	PO3	1	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to design different electrical system components
	PO 4	3	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to conduct investigations or research of complex problems
	PO 5	3	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to familiarize with modern tool usage
	PO 8	1	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO 9	2	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis makes the engineers to work individually and in a team
	PO 10	3	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis makes the engineer able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
	PO 12	2	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to equip electrical engineers for lifelong learning
	PSO1	2	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to design and maintain various systems in electrical engineering

	PS02	2	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis are required to find solutions to complex electrical engineering problems
	PSO3	2	Knowledge of developing a frequency domain model of power system networks and conducting the stability analysis is required to equip electrical engineers for lifelong learning
CO 3	PO1	3	Knowledge of testing of power system components is required to solve different operational problems in electrical engineering
	PO2	1	Knowledge of testing of power system components is required for problem analysis in electric systems
	PO 3	1	Knowledge of testing of power system components is required to design different electrical system components
	PO 4	3	Knowledge of testing of power system components is required to conduct investigations or research of complex problems
	PO 5	3	Knowledge of testing of power system components is required to familiarize with modern tool usage
	PO 6	3	Knowledge of testing of power system components to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues
	PO 7	1	Knowledge of testing of power system components is required to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
	PO 8	3	Knowledge of testing of power system components is required to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO 9	3	Testing of power system components makes the engineers to work individually and in a team
	PO 10	3	Knowledge of testing of power system components make effective presentations, and give and receive clear instructions.
	PO 12	3	Knowledge of testing of power system components is required to equip electrical engineers for lifelong learning
	PSO1	2	Knowledge of testing of power system components is necessary to design and maintain various systems in electrical engineering
	PS02	2	Knowledge of testing of power system components is required to find solutions to complex electrical engineering problems

	PSO3	2	Knowledge of testing of power system components is required to equip electrical engineers for lifelong learning
CO 4	PO1	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to solve different operational problems in solar plant installation
	PO 2	1	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required for problem analysis in solar power systems
	PO 3	1	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to design different solarl system components
	PO 4	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to conduct investigations or research of complex problems in solar power system
	PO 5	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to familiarize with modern tool usage in solar installations
	PO 6	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues
	PO 7	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
	PO 8	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
	PO 9	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant makes the engineers to work individually and in a team
	PO 10	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant makes the engineer able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
	PO 11	2	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to apply these to one's own work, as a member and leader in a team, to manage projects and in

			multidisciplinary environments.
	PO 12	3	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to equip electrical engineers for lifelong learning
	PSO1	2	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to design and maintain various systems in electrical engineering
	PS02	2	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant to complex electrical engineering problems
	PSO3	2	Knowledge of conducting site inspection and evaluating performance ratio of solar power plant is required to equip electrical engineers for lifelong learning

EEL 334	**POWER ELECTRONICS LAB**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		0	0	3	2	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
CO1	Determine the characteristics of SCR and design triggering circuits for SCR based circuits.	K3
CO2	Design, set up and analyse single phase AC voltage controllers.	K3
CO3	Design, set up and test suitable gate drives for MOSFET/IGBT.	K3
CO4	Design, set up and test basic inverter topologies	K3
CO5	Design and set up dc-dc converters.	
CO6	Develop simulation models of dc-dc converters, rectifiers and inverters using modern simulation tools.	

MAPPING

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2					3	2		3	1	1	1
CO2	3	3	2	2					3	2		3	2	2	2
CO3	3	3	2	2					3	2		3	2	2	2
CO4	3	3	2	2					3	2		3	2	2	2
CO5	3	3	2	2					3	2		3	2	2	3
CO6	3	3	2	2	3				3	2		3	3	3	3
Average	3	3	2	2	3				3	2		3	2	2	2

JUSTIFICATION

CO1	An in-depth knowledge of electrical and electronics engineering (PO1) Apply the basic principles of mathematics and engineering sciences (PO2) Design and develop different triggering circuits for various applications (PO3, PO4) Able to work as a team for designing various circuits using power electronic devices and related ICs (PO9) To communicate effectively on complex engineering activities with the engineering community and with society by doing course project related to power electronics applications and thereby able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (PO10) Able to engage in lifelong learning of power electronic devices and circuits (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of various triggering circuits such as R,RC,UJT and TRIAC circuits for various applications.

Signed By:Devassia V P
Date:14.09.2023 19:21

CO2	An in-depth knowledge of electrical and electronics engineering (PO1) Apply the basic principles of mathematics and engineering sciences (PO2) Design and develop AC voltage controller circuits for various applications (PO3, PO4) Able to work as a team for designing various power electronic circuits (PO9) Communicate effectively on complex engineering activities with the engineering community and with society by doing course project related to power electronics applications and thereby able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (PO10) Able to engage in lifelong learning of power electronic devices and circuits (PO12) Apply knowledge (PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of AC voltage controller circuits for various applications

CO3	An in-depth knowledge of electrical and electronics engineering (PO1) Apply the basic principles of mathematics and engineering sciences (PO2) Design and develop gate drives for MOSFET/IGBT for various applications (PO3, PO4) To be able to work as a team for designing various power electronic circuits (PO9) To communicate effectively on complex engineering activities with the engineering community and with society by doing course project related to power electronics applications and thereby able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (PO10) Able to engage in lifelong learning of power electronic devices and circuits (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of gate drives for MOSFET/IGBT circuits for various applications

CO4	An in-depth knowledge of electrical and electronics engineering (PO1) Apply the basic principles of mathematics and engineering sciences (PO2) Design and develop inverter circuit for various applications (PO3, PO4) To be able to work as a team for designing various power electronic circuits (PO9) To communicate effectively on complex engineering activities with the engineering community and with society by doing course project related to power electronics applications and thereby able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (PO10) Able to engage in lifelong learning of power electronic devices and circuits (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of inverter circuits for various applications

CO5	An in-depth knowledge of electrical and electronics engineering (PO1) Apply the basic principles of mathematics and engineering sciences (PO2) Design and develop DC-DC converters for various applications in the field of technology (PO3) Able to design experiments on power electronic applications by using appropriate power electronics converters .(PO4) Able to work as a team for designing various DC-DC converters for various applications (PO9) Communicate effectively on complex engineering activities with the engineering community and with society by doing course project related to power electronics applications and thereby able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (PO10) Able to engage in lifelong learning on various DC-DC power electronics converters (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of various Buck,Boost and Buck-Boost Converters for various applications(PSO2)

CO6	An in-depth knowledge of electrical and electronics engineering (PO1) Apply the basic principles of mathematics and engineering sciences (PO2) Design and develop power electronic circuits for various applications in the field of technology (PO3) Able to design experiments on power electronic applications by using appropriate power electronics converters in MATLAB/ Simulink (PO4) Able to identify and select DC-DC converters, rectifiers, inverters for various applications using MATLAB/ Simulink (PO5) Able to work as a team to design different power electronics converters for various power electronics applications in MATLAB/ Simulink (PO9) To communicate effectively on complex engineering activities with the engineering community and with society by doing course project related to power electronics applications and thereby able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions (PO10) Able to engage in lifelong learning of designing different power electronics converters in MATLAB/ Simulink for various power electronics applications(PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of various power electronics converters in MATLAB/ Simulink for various power electronics applications

HUT 300	Industrial Economics & Foreign Trade	L	T	P	CREDIT	Year of Introduction
		3	0	0	3	2019

COURSE OUTCOMES

CO 1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare.
CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production
CO 3	Determine the functional requirement of a firm under various competitive conditions
CO 4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society

CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm

MAPPING

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

JUSTIFICATION

CO	**PO**	**LEVEL**	**REMARKS**
CO 1	PO 1	2	By understanding the Scarcity and choice – Basic economic problems - PPC
	PO11	3	By understanding the changes in demand and supply and itseffects student will be able to engage in continuous learning.
	PSO1	1	By understanding the basic concepts and demand, supply analysis, the students will be able to Apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systemsand address challenges in the field.
	PO 1	2	By understanding the Production function and law of variable proportion.
	PO 2	2	By understanding the Economies of scale – internal and external economies of scale.

CO 2	PO5	2	By understanding the Cost concepts, students will be able to communicate on complex engineering activities with the engineering community and with the society.
	PO6	2	By understanding the Short run cost curves & Long run cost curves.
	PO7	3	By analyzing the Revenue (concepts) – shutdown point – Break-even points students will be able to engage in continuous learning
	PO11	3	By analyzing the production and cost student will be able to engage in continuous learning.
	PSO1	1	By understanding the production and cost, the students will be able to Apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field.
	PO 1	2	By analyzing the market structure, types and product pricing, the student will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	2	By analyzing market structure , types and product pricing , the student will be able to identify, analyze and make conclusions of simple engineering problems.
CO 3	PO 3	1	By analyzing market structure, types and product pricing,, the student will be able to design solutions for simple engineering problems.
	PO 11	3	By analyzing market structure, types and product pricing, the student will be able to conduct investigations of complex problems and provide valid conclusions.
	PSO1	1	By analysing, market structure,types and product pricing the student will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and addresschallenges in the field
	PO 1	2	By understanding the macro economic concepts, Inflation and business financing, the student will be able to apply the knowledge on complex engineering problems.

CO 4	PO 2	2	By understanding the macro economic concepts, Inflationand business financing, the student will be able to identifyformulate and analyze simple engineering problems.
	PO 3	1	By understanding the macro economic concepts, Inflation and business financing , the student will be able to engagein continuous learning,.
	PO6	1	By understanding the macro economic concepts, Inflation and business financing , the student will be able to engagein continuous learning.
	PO 11	3	By understanding the macro economic concepts, Inflation and business financing the student will be able to conduct investigations of complex problems and provide valid conclusions.
	PSO1	1	By understanding the macro economic concepts, Inflation and business financing , the student will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field
CO 5	PO 1	2	By understanding international trade, trade policy and tariff and non-tariff barriers the students will be able to apply the knowledge on complex engineering problems..
	PO 2	2	By understanding international trade, trade policy and tariffand non-tariff barriers the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	1	By understanding international trade, trade policy and tariffand non-tariff barriers the student will be able to design solutions for simple engineering problems.
	PO 11	3	By understanding international trade, trade policy and tariff and non-tariff barriers , the student will be able to conduct investigations of complex problems and provide valid conclusions.
	PSO 1	1	By understanding international trade, trade policy and tariff and non-tariff barriers the students will be able to apply knowledge of mathematics ,science and engineering to design commission and maintain various type of electrical systems and address challenges in the field.

EET 312	BIOMEDICAL INSTRUMENTATION	L	T	P	CREDIT	Year of Introduction
		2	1	0	3	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
CO1	Explain the anatomy and physiology of human body, bioelectricpotentials and electrodes.	K2
CO2	Explain different techniques for the measurement of various physiological parameters.	K2
CO3	Summarize the working of Electroencephalogram (EEG) and Electromyogram (EMG).	K2
CO4	Explain the working of various modern imaging systems and therapeutic equipments used in biomedical field	K2
CO5	Discuss the patient safety measures and recent advancements in medical field	K2

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EET312.1	2	-	-	-	-	1	-	-	-	-	-	-	1	-	-
EET312.2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
EET312.3	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-
EET312.4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EET312.5	2	2	2	-	-	1	-	-	-	-	-	2	2	2	-
Average	2	2	2	-	-	1	-	-	-	-	-	2	2	2	-

JUSTIFICATION

CO-PO-PSO	LEVEL	JUSTIFICATION
EET312.1-PO1	2	Apply the knowledge of science and engineering fundamentals to identify biopotential and electrodes
EET312.1-PO6	1	Solve real world problems by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities
EET312.1-PSO1	1	Model and solve real world problems related to human body andhealth sector
EET312.2-PO1	2	In-depth knowledge to identify different techniques for the measurement of various physiological parameters
EET312.2-PO3	2	Develop products, processes or technologies for themeasurement of various physiological parameters
EET312.3-PO1	2	In-depth knowledge in various modern imaging systems used in biomedical field
EET312.3-PSO1	1	Identify and solve real world problems related to human body bythe use of modern biomedical instruments
EET312.4-PO1	2	In-depth knowledge in various modern imaging systems used in biomedical field
EET312.5-PO1	2	Apply the knowledge of science and engineering fundamentals to identify patient safety measures and recent advancements in medical field
EET312.5-PO2	2	Analyze various patient safety measures and recent advancements in medical field
EET312.5-PO3	2	Design and develop new patient safety measures in medical field
EET312.5-PO6	1	Solve medical field problems by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities
EET312.5-PO12	2	Engage in independent and life-long learning by recent advancements in medical field
EET312.5-PSO1	2	Maintain patient safety measures in the design, commission ofvarious types of electrical systems in medical field
EET312.5-PSO2	2	Develop sustainable solutions to complex electrical engineering problems in patient safety measures in hospitals.

EET 308	COMPREHENSIVE COURSE WORK	L	T	P	CREDIT	Year of Introduction
		1	0	0	1	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET308.1	Apply the knowledge of circuit theorems to solve the problems in electrical networks	K3
EET308.2	Evaluate the performance of DC machines and Transformers under different loading conditions	K3
EET308.3	Identify appropriate digital components to realise any combinational or sequential logic.	K3
EET308.4	Apply the knowledge of Power generation, transmission and distribution to select appropriate components for power system operation.	K3
EET308.5	Apply appropriate mathematical concepts to analyse continuous time and discrete time signals and systems	K3

MAPPING

PO CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	-	-	-	-	-	-	2	2	2	1
CO2	3	2	-	-	-	-	-	-	-	-	-	2	2	2	2
CO3	3	3	1	-	1	-	-	-	-	-	-	2	1	1	-
CO4	3	3	-	-	-	1	1	1	-	-	1	2	2	2	2
CO5	3	3	1	-	1	-	-	-	-	-	-	2	2	2	1

Signed By:Devassia V P
Date:14.09.2023 19:21

JUSTIFICATION

CO-PO-PSO	LEVEL	JUSTIFICATION
CO1-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while applying the knowledgeof circuit theorems to solve the problems in electrical networks.
CO1-PO2	3	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with circuit theorems to solve the problems in electrical networks
CO1-PO12	2	Get lifelong learning while applying the knowledge of circuit theorems to solve the problems in electrical networks
CO1-PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field while applying the knowledge of circuit theorems to solve the problems in electrical networks
CO1-PSO2	2	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in connection with circuit theorems to solve the problems in electrical networks
CO1-PSO3	1	Students will be able to lifelong learning so as to adapt to dynamic changes in Electrical Engineering in connection with circuittheorems to solve the problems in electrical networks.
CO2-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying the performanceof different types of DC machines and Transformers under different loading conditions.
CO2-PO2	2	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences to study the performance of different types of DC machines and Transformers under different loading conditions.
CO2- PO12	2	Get lifelong learning while studying the performance of different types of DC machines and Transformers under different loading conditions.

CO2- PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field while studying the performance of different types of DC machines and Transformers
CO2- PSO2	2	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in connection with DC machines and Transformers under different loading conditions.
CO2- PSO3	2	Students will be able to lifelong learning so as to adapt to dynamic changes in Electrical Engineering in connection with studying the performance of different types of DC machines and Transformers
CO3-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while Identify appropriate digital components to realise any combinational or sequential logic.
CO3-PO2	3	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with Identification of appropriate digital components to realise any combinational or sequential logic
CO3-PO3	1	Students will be able to 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 while studying combinational or sequential digital logic circuits
CO3-PO5	1	Students will be able to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to Identify appropriate digital components to realise any combinational or sequential logic
CO3-P012	2	Students will be able to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in combinational or sequential digital logic circuits
CO3-PSO1	1	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field to Identify appropriate digital components to realise any combinational or sequential logic

CO3-PSO2	1	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in connection withIdentification of appropriate digital components to realise any combinational or sequential logic
CO4-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying Power generation, transmission and distribution to select appropriate components for power system operation.
CO4-PO2	3	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with Electric Power generation, transmission and distribution.
CO4-PO6	1	Students will be able to 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 in connection with Electric Power generation, transmission and distribution.
CO4-PO7	1	Students will be able to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable
		development in Electric Power generation, transmission and distribution.
CO4-PO8	1	Students will be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice in Electric Power generation, transmissionand distribution.
CO4-PO11	1	Students will be able to 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 in connection with Electric Power generation, transmission and distribution.
CO4-P012	2	Students will be able to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in Electric Power generation, transmission and distribution.
CO4-PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field in Electric Power generation, transmission and distribution.

CO4-PSO2	2	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in connection withElectric Power generation, transmission and distribution to select appropriate components for power system operation
CO4-PSO3	2	Students will be able to lifelong learning so as to adapt to dynamic changes in Electrical Engineering in Electric Power generation, transmission and distribution to select appropriate components for power system operation
CO5-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals to apply appropriatemathematical concepts to analyse continuous time and discrete time signals and systems
CO5-PO2	3	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences to apply appropriate mathematical concepts to analyse continuous time and discrete time signals and systems
CO5-PO3	1	Students will be able to 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 to apply appropriate mathematical concepts to analyse continuous time and discrete time signals and systems
CO5-PO5	1	Students will be able to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools to solve and analyse continuous time and discrete time signals and systems
CO5-P012	2	Get lifelong learning while studying the continuous time and discrete time signals and systems
CO5-PSO1	2	Students will be able to apply knowledge of mathematics, scienceand engineering to design, commission and maintain various types of electrical systems and address challenges in the field in connection with continuous time and discrete time signals andsystems
CO5-PSO2	2	Students will be able to derive sustainable solutions to complexelectrical engineering problems that meet the specified needs with ethical, social and environmental considerations in connection withcontinuous time and discrete time signals and systems

CO5-PSO3	1	Students will be able to lifelong learning so as to adapt to dynamic changes in Electrical Engineering in continuous time and discretetime signals and systems

7

EET 401	ADVANCED CONTROL THEORY	L	T	P	CREDIT	Year of Introduction
		2	1	0	3	2019

COURSE OUTCOMES

CO1	Develop the state variable representation of physical systems
CO2	Analyze the performance of linear and nonlinear systems using state variable approach
CO3	Design state feedback controller for a given system
CO4	Explain the characteristics of nonlinear systems
CO5	Apply the tools like describing function approach or phase plane approach for assessing the performance of nonlinear systems
CO6	Apply Lyapunov method for the stability analysis of physical systems

MAPPING

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

JUSTIFICATION

Mapping	Mapping level (3/2/1)	Justifications
CO1 - PO1	3	State variables is essential in knowledge of control system engineering
CO1 - PO2	3	State variables is essential in solving fundamental control system problems
CO1 - PO12	2	Fundamental understanding of state variables is essential in gaining further knowledge in the domain
CO1 - PSO 1	2	State variables is essential in knowledge of complex electrical engineering
CO2 - PO1	3	Analysis of linear and nonlinear systems is essential in knowledge of control system engineering
CO2 - PO2	3	Analysis of linear and nonlinear systems is essential in solving fundamental control system problems
CO2 - PO3	2	Analysis of linear and nonlinear systems is essential in design and solving fundamental control system problems
CO2 - PO1 2	2	Fundamental understanding of Analysis of linear and nonlinear systems isessential in gaining further knowledge in the domain
CO2 - PSO1	2	Analysis of linear and nonlinear systems is essential in knowledge of complex electrical engineering
CO3 - PO1	3	Controlability and Observability is essential in knowledge of control system engineering
CO3 - PO2	3	Controlability and Observability is essential in solving fundamental control system problems
CO3 - PO3	3	Controlability and Observability is essential in design and solving fundamental control system problems
CO3 - PO1 2	2	Controlability and Observability is essential in gaining further knowledge in the domain
CO3 - PSO1	2	Controlability and Observability is essential in knowledge of complex electrical engineering
CO4 - PO1	3	Characterestics of nonlinear systems is essential in knowledge of control system engineering
CO4 - PO2	2	Characterestics of nonlinear systems is essential in solving fundamentalcontrol system problems

CO4 - PO12	2	Characterestics of nonlinear systems is essential in gaining further knowledge in the domain
CO4 - PSO1	2	Characterestics of nonlinear systems is essential in knowledge of complex electrical engineering
CO5 - PO1	3	Analysis of nonlinear systems is essential in knowledge of control system engineering
CO5 - PO2	3	Analysis of nonlinear systems is essential in solving fundamental control system problems
CO5 - PO3	2	Analysis of nonlinear systems is essential in design and solving fundamental control system problems
CO5 - PO12	2	Fundamental understanding of Analysis of nonlinear systems is essential in gaining further knowledge in the domain
CO5 - PSO1	2	Analysis of nonlinear systems is essential in knowledge of complex electrical engineering
CO6 - PO1	3	Stability analysis of physical systems is essential in knowledge of control system engineering
CO6 - PO2	3	Stability analysis of physical systems is essential in solving fundamental control system problems
CO6 - PO3	2	Stability analysis of physical systems is essential in design and solving fundamental control system problems
CO6 - PO12	2	Stability analysis of physical systems is essential in gaining further knowledge in the domain
CO6 - PSO1	2	Stability analysis of physical systems is essential in knowledge of complex electrical engineering

MCN 401	**INDUSTRIAL SAFETY ENGINEERING**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		2	1	0	-	2019

COURSE OUTCOMES

CO 1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)	K 2
CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)	K 2
CO 3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)	K 2
CO 4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)	K 2
CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)	K 3

MAPPING

MCN 401	INDUSTRIAL SAFETY ENGINEERING													
COs/POs	**PO1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	2	-	-	-	2	2	2	-	-	-	1	2	2	1
CO2	2	1	2	-	1	1	1	1	-	-	-	1	2	2	1
CO3	2	2	2	-	1	1	1	1	1	1	-	1	2	2	1
CO4	2	2	2	-	1	1	1	1	1	1	-	1	2	2	1
CO5	2	2	2	1	1	1	1	1	1	1	-	1	2	2	1
Average	2	1.8	2	1	1	1.2	1.2	1.2	1	1	-	1	2	2	1

Signed By:Devassia V P
Date:14.09.2023 19:21

JUSTIFICATION

CO	PO/PSO	Level	Justification
CO1	PO1	2	Knowledge of accident causation theories and preventive measures is required to safely conduct all activities such as problem solving in engineering
	PO2	2	Knowledge of accident causation theories and preventive measures is required to conduct all engineering activities involving identifying and analysing a system
	PO6	2	Knowledge of accident causation theories and preventive measures is required to assess societal health and safety issues and provide engineering solutions
	PO7	2	Knowledge of accident causation theories and preventive measures is required to provide a safe and sustainable environment
	PO8	2	Knowledge of accident causation theories and following safety measures is required as part of work ethics
	PO12	1	Safety is inevitable in a work environment and is a lifelong learning process
	PSO1	2	Knowledge of accident causation theories and preventive measures is required to design and maintain electrical engineering systems with due consideration for safety
	PSO2	2	Knowledge of accident causation theories and preventive measures is required to derive safe and sustainable solutions to electrical engineering problems
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning
CO2	PO1	2	Knowledge of various PPEs, safety performance indicators and importance of housekeeping is required to safely conduct all engineering problem
	PO2	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in safely conducting engineering activities involving identifying and analysing a system
	PO3	2	Knowledge of safety performance indicators and importance of housekeeping are all required while designing an engineering system
	PO5	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in selecting and using modern safety tools
	PO6	1	Knowledge of various safety performance indicators will help in assessing societal health and safety issues and provide engineering solutions
	PO7	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in providing a safe and

			sustainable environment
	PO8	1	Knowledge of various PPEs, safety performance indicators and importance of housekeeping will help in inculcating work ethics
	PO12	1	Safety is inevitable in a work environment and is a lifelong learning process
	PSO1	2	Knowledge of various PPEs, safety performance indicators and importance of housekeeping is required to design and maintain an electrical engineering system with due consideration for safety
	PSO2	2	Knowledge of various PPEs, safety performance indicators and importance of housekeeping is required to derive safe and sustainable solutions to electrical engineering problems
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning
CO3	PO1	2	Knowledge of different safety issues in construction industry is required to safely conduct all engineering activities such as problem solving
	PO2	2	Knowledge of different safety issues in construction industry is required to safely conduct all engineering activities involving identifying and analysing a system or process
	PO3	2	Knowledge of different safety issues in construction industry is required to design an engineering process or system with due consideration for safety
	PO5	1	Knowledge of different safety issues in construction industry will help in selecting and using modern safety tools and equipment
	PO6	1	Knowledge of different safety issues in construction industry will help in assessing the societal health and safety issues and provide solutions to it
	PO7	1	Knowledge of different safety issues in construction industry and following preventive measures will help in providing a safe and sustainable environment
	PO8	1	Knowledge of different safety issues in construction industry and following their control measures will help in inculcating work ethics in construction workers
	PO9	1	Knowledge of different safety issues in construction industry will help workers to work better individually as well as in a team
	PO10	1	Communication of safety issues and the control measures will help in providing a safe environment at the work place
	PO12	1	Safety is inevitable in a work environment and is a lifelong learning process
	PSO1	2	Knowledge of different safety issues in construction industry is required to design and maintain electrical equipment in construction industry with due consideration for safety
	PSO2	2	Knowledge of different safety issues in construction industry is required to derive safe and sustainable solutions to electrical engineering problems in construction processes
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning

CO4	PO1	2	Knowledge of safety hazards in general machines and material handling machines is required to safely solve an engineering problem
	PO2	2	Knowledge of safety hazards in general machines and material handling machines is required to safely analyse an engineering problem
	PO3	2	Knowledge of safety hazards in general machines and material handling machines is required to design an engineering system with due consideration for safety
	PO5	1	Knowledge of safety hazards in general machines and material handling machines will help in selecting and using modern safety tools
	PO6	1	Knowledge of safety hazards in general machines and material handling machines will help in assessing the societal health and safety issues and provide solutions to it
	PO7	1	Knowledge of safety hazards in general machines and material handling machines will help in providing a safe and sustainable environment
	PO8	1	Knowledge of safety hazards in general machines, material handling machines and following their control measures will help in inculcating work ethics in workers
	PO9	1	Knowledge of safety hazards in general machines and material handling machines will help workers to work better individually as well as in a team
	PO10	1	Communication of safety issues and control measures will help provide a safe environment at the work place
	PO12	1	Safety is inevitable in a work environment and is a lifelong process
	PSO1	2	Knowledge of safety hazards in general machines and material handling machines is required to design and maintain electrical engineering systems with due consideration for safety
	PSO2	2	Knowledge of safety hazards in general machines and material handling machines is required to derive safe and sustainable solutions in electrical material handling equipment and other machines
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning
CO5	PO1	2	Knowledge of hazards identification tools and various chemical hazards is required to safely conduct all engineering activities such as problem solving especially in a chemical industry
	PO2	2	Knowledge of hazards identification tools and various chemical hazards is required to safely conduct all engineering activities such as identifying and analysing an engineering problem
	PO3	2	Knowledge of hazards identification tools and various chemical hazards is required to safely design an engineering process or system
	PO4	1	Knowledge of hazards identification tools and various chemical hazards will help in investigating a hazardous process for its safety issues
	PO5	1	Knowledge of hazards identification tools and various chemical hazards will help in selecting and using modern safety tools

	PO6	1	Knowledge of hazards identification tools and various chemical hazards will help in assessing the societal health and safety issues and provide solutions to it
	PO7	1	Knowledge of hazards identification tools and various chemical hazards will help in providing a safe and sustainable environment
	PO8	1	Knowledge of hazards identification tools, various chemical hazards and following their control measures will help in inculcating work ethics in workers
	PO9	1	Knowledge of hazards identification tools and various chemical hazards will help workers to work individually as well as in a team
	PO10	1	Communication of safety issues and control measures will help provide a safe environment at the work place
	PO12	1	Safety is inevitable in a work environment and involves lifelong learning
	PSO1	2	Knowledge of hazards identification tools and various chemical hazards is required to identify hazards in designing, commissioning and maintaining an electrical engineering system
	PSO2	2	Knowledge of hazards identification tools and various chemical hazards is required to derive safe and sustainable solutions to hazardous electrical engineering processes that may or may not involve chemicals
	PSO3	1	Safety is inevitable in a work environment and involves lifelong learning

EET 473	**DIGITAL PROTECTION OF POWER SYSTEMS**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		2	1	0	3	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET473.1	Identify the relay protection scheme suitable for over current, differential and distance protection.	K2
EET473.2	Develop the protection scheme for bus bars, transformers, generators, motors and distribution systems using appropriate protective relays.	K3
EET473.3	Illustrate the operation of a numerical relay in his/her own way.	K2
EET473.4	Explain signal processing methods and algorithms in digital protection.	K2
EET473.5	Infer emerging protection schemes in power systems.	K2

MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	1	-	-
CO5	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-
AVG	3	2	3	2	-	-	-	-	-	-	-	-	1	-	-

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
EET 473.1-PO1	H	In depth engineering knowledge to develop relay protection scheme suitable for over current, differential and distance protection.
EET 473.1-PO2	M	Analyze relay protection scheme suitable for over current, differential and distance protection.
EET 473.1-PSO1	L	Develop relay protection scheme suitable for over current, differential and distance protection to design, commission and maintain various types of electrical systems
EET 473.2-PO1	H	In depth engineering knowledge to develop the protection scheme for bus bars, transformers, generators, motors anddistribution systems
EET 473.2-PO2	H	Analyze the protection scheme for bus bars, transformers, generators, motors and distribution systems
EET 473.2-PO3	H	Develop the solution for the the protection scheme for bus bars, transformers, generators, motors and distribution systems
EET 473.2-PSO1	L	Develop the protection scheme for bus bars, transformers, generators, motors and distribution systems to design, commission and maintain various types of electrical systems
EET 473.3-PO1	H	In depth engineering knowledge the operation of a numerical relay
EET 473.3-PO2	M	Analyze the operation of a numerical relay
EET 473.3-PO3	H	Develop solution operation of a numerical relay
EET 473.3-PSO1	L	Derive sustainable solutions to the operation of a numericalrelay
EET 473.4-PO1	H	In depth engineering knowledge to develop the signal processing methods and algorithms in digital protection.
EET 473.4-PO2	M	Analyze signal processing methods and algorithms in digital protection.

EET 473.4-PO3	H	Develop the solution for signal processing methods and algorithms in digital protection.
EET 473.4-PSO1	L	Develop the solution for signal processing methods and algorithms in digital protection to design, commission andmaintain various types of electrical systems
EET 473.5-PO1	H	In depth knowledge in protection schemes in power systems
EET 473.5-PO2	H	Analyze new protection schemes in power systems
EET 473.5-PO4	M	Study the protection schemes in power systems to design,commission and maintain various types of electrical systems

EEQ 413	**SEMINAR**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		0	0	3	2	2019

COURSE OUTCOMES

CO	**Course outcome**	**Knowledge level**
EEQ413.1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).	K3
EEQ413.2	Read and apprehend an academic document from the literature whichis related to her/ his areas of interest (Cognitive knowledge level: Analyze).	K4
EEQ413.3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).	K6
EEQ413.4	Give a presentation about an academic document (Cognitive knowledge level: Apply).	K3
EEQ413.5	Prepare a technical report (Cognitive knowledge level: Create).	K6

MAPPING

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
EEQ413.1	2	2	1	1		2	1					3			2
EEQ413.2	3	3	2	3		2	1					3			2
EEQ413.3	3	2			3			1		2		3			2
EEQ413.4	3				2			1		3		3			2
EEQ413.5	3	3	3	3	2	2		2		3		3			2
Average	2.8	2	1.2	1.4	1.4	1.2	0.4	0.8		1.6		3			2

JUSTIFICATION

CO	PO/ PSO	Mapping	Justification
EEQ413.1	PO1	2	Students will be able to apply the knowledge to identify academic documents from the literature.
	PO2	2	Students will be able to analyse the academic documents by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	1	Students will be able to design system components based on the academic documents available in the literature.
	PO4	1	Students will be able to provide valid conclusions regarding complex engineering based problems by the literature survey.
	PO6	2	Students will be able to apply reasoning based on the academic documents to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.
	PO7	1	Students will be able to understand the impact of the engineering solutions in societal and environmental contexts for sustainable development.
	PO12	3	Students will be able to have lifelong learning with technological changes in improvement by referring various academic

			documents.
	PSO 3	2	Students will be able to have lifelong learning with the help of academic documents available in literature so as to adapt to dynamic changes electrical engineering.
EEQ413.2	PO1	3	Students will be able to apply the knowledge to apprehend an academic document from the literature.
	PO2	3	Students will be able to analyse the academic documents by using principles of mathematics, natural sciences, and engineering sciences.
	PO3	2	Students will be able to design system components based on the academic documents available in the literature.
	PO4	3	Students will be able to provide valid conclusions regarding complex engineering based problems by the literature survey of academic documents.
	PO6	2	Students will be able to apply reasoning based on the academic documents to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.
	PO7	1	Students will be able to understand the impact of the engineering solutions in societal and environmental contexts for sustainable development based on literature survey.
	PO12	3	Students will be able to have lifelong learning with technological changes in improvement by referring various academic documents and literature survey.
	PSO3	2	Students will be able to have lifelong learning by apprehending academic documents available in literature so as to adapt to dynamic changes electrical engineering.
EEQ413.3	PO1	3	Students will be able to apply the knowledge to prepare a
			presentation based on academic documents from the literature.
			Students will be able to analyse the presentation based on
	PO2	2	academic documents by using principles of mathematics, natural
			sciences, and engineering sciences.
			Students will be able to create, select, and apply appropriate
	PO5	3	techniques, resources, and modern engineering and IT tools for
			preparing a presentation based on academic documents.
			Students will be able to apply ethical principles and commit to
	PO8	1	professional ethics and responsibilities while preparing a
			presentation.
			Students will be able to communicate effectively on complex
	PO10	2	engineering activities with the engineering community and with society being able to comprehend and make effective presentations.
			Students will be able to have lifelong learning with technological
	PO12	3	changes in improvement by preparing presentations based on
			various academic documents.

			Students will be able to have lifelong learning by preparing
	PSO3	2	presentations based on academic documents in electrical engineering.
			Students will be able to apply the knowledge to give a
	PO1	3	presentation based on academic documents from the literature.
			Students will be able to create, select, and apply appropriate
EEQ413.4	PO5	2	techniques, resources, and modern engineering and IT tools for delivering a presentation based on academic documents.
			Students will be able to apply ethical principles and commit to
	PO8	1	professional ethics and responsibilities while presenting a
			presentation.
	PO10	3	Students will be able to communicate effectively on complex engineering activities with the engineering community and with society being able to comprehend and deliver effective presentations.
	PO12	3	Students will be able to have lifelong learning with technological changes in improvement by delivering presentations based on various academic documents.
	PSO3	2	Students will be able to have lifelong learning by delivering presentations based on academic documents in electrical engineering.
EQ413.5	PO1	3	Students will be able to apply the knowledge to prepare a technical report from the literature.
	PO2	3	Students will be able to analyse the academic documents by using principles of mathematics, natural sciences, and engineering sciences to prepare a technical report.
	PO3	3	Students will be able to design system components based on the academic documents available in the literature.
	PO4	3	Students will be able to provide valid conclusions regarding complex engineering based problems by the literature survey of academic documents and preparing a technical report.
	PO5	2	Students will be able to create, select, and apply appropriate techniques, resources, and modern engineering and IT tools for preparing a technical report based on academic documents.
	PO6	2	Students will be able to apply reasoning while preparing technical reports based on the academic documents to assess societal issues and the consequent responsibilities relevant to the professional engineering practice.
	PO8	2	Students will be able to apply ethical principles and commit to professional ethics and responsibilities while preparing a technical report.
	PO10	3	Students will be able to communicate effectively on complex engineering activities with the engineering community and with society by preparing a technical report.
	PO12	3	Students will be able to have lifelong learning with technological changes in improvement by preparing technical reports based on various academic documents.
	PSO3	2	Students will be able to have lifelong learning by preparing technical reports based on academic documents in electrical engineering.

EEL 411	CONTROL SYSTEMS LAB	L	T	P	CREDIT	Year of Introduction
		0	0	3	2	2019

COURSE OUTCOMES

1	Demonstrate the knowledge of simulation tools for control system design.
2	Develop the mathematical model of a given physical system by conducting appropriate experiments.
3	Analyse the performance and stability of physical systems using classical and advanced control approaches.
4	Design controllers for physical systems to meet the desired specifications.

MAPPING

EEL 411 Control Systems Lab															
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	3	3				3	3		3	2	2	2
CO2	3	3	3	3	3				3	3		3	2	2	2
CO3	3	3	3	3	3				3	3		3	2	2	2
CO4	3	3	3	3	3				3	3		3	2	2	2
Average	3	3	3	3	3				3	3		3	2	2	2

JUSTIFICATION

1	Able to have knowledge about different control system tools in MATLAB/ Simulink (PO1) Able to apply the basic principles of mathematics and engineering sciences (PO2) Able to design and develop control system for various applications in the field of technology (PO3) Able to design experiments on control system applications by using appropriate tools in MATLAB/ Simulink (PO4) Able to identify and select suitable tool boxes for various applications using MATLAB/ Simulink (PO5) Able to work as a team to design proper controller for various control applications by using appropriate tools in MATLAB/ Simulink (PO9) Able to communicate effectively on control applications by doing experiments and thereby able to comprehend and summarize the evaluation. (PO10) Able to engage in lifelong learning of designing different control circuits using various tool boxes in MATLAB/ Simulink for various control applications(PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of control system design using simulation tools in MATLAB/ Simulink for various applications

2	Able to have a knowledge in developing mathematical model of any physical system by using MATLAB/ Simulink (PO1) Able to formulate the mathematical modelling for electrical, mechanical and electromechanical system(PO2) Able to develop mathematical model of any physical system using various toolboxes in MATLAB/ Simulink in the field of technology (PO3) Able to design experiments, analyse and interpret data from the simulation result on control system applications by using appropriate tools in MATLAB/ Simulink (PO4) Able to identify, select and apply appropriate techniques to analyse a given system by using appropriate tools in MATLAB/ Simulink (PO5) Able to work as a team to design and analyse a given physical system using MATLAB/ Simulink (PO9) Able to communicate effectively on control applications by doing experiments and thereby able to comprehend and summarize the evaluation. (PO10) Able to engage in lifelong learning of developing mathematical model of any physical system by using MATLAB/ Simulink (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of developing mathematical model of any physical system using simulation tools in MATLAB/ Simulink,

Signed By:Devassia V P
Date:14.09.2023 19:21

3	Able to have an in-depth knowledge about various methods for the stability analysis of a physical systemPO1) Analyse the performance and stability of any physical systems by various techniques using MATLAB/ Simulink (PO2) Able to design and develop a stable physical system using MATLAB/ Simulink (PO3) Able to design experiments, analyse and interpret data from the simulation result for the analysis of the performance of any physical systems by using appropriate tools in MATLAB/ Simulink (PO4) Able to identify, select and apply appropriate techniques to analyse a given system by using appropriate tools in MATLAB/ Simulink (PO5) Able to work as a team to design and analyse stability for various physical systems using MATLAB/ Simulink (PO9) Able to communicate effectively on control applications by doing experiments and thereby able to comprehend and summarize the evaluation on stability analysis. (PO10) Able to engage in lifelong learning on stability analysis of any physical system by using MATLAB/ Simulink for various control applications (PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) to analyse the performance and stability of any physical system using simulation tools in MATLAB/ Simulink for various applications

4	Able to have an in-depth knowledge about various controllers(PO1) Analyse the performance of various controllers using MATLAB/ Simulink (PO2) Ability to design and develop proper controller for any physical system using MATLAB/ Simulink in the field of technology (PO3) Able to design controllers for physical systems to meet the desired specifications and analyse the simulation result using appropriate tools in MATLAB/ Simulink (PO4) Able to identify, select and apply proper controller for a given system by using appropriate tools in MATLAB/ Simulink (PO5) Able to work as a team to design and analyse the effect of different controllers for various control applications using MATLAB/ Simulink (PO9) Able to communicate effectively about various controllers for meeting specified requirements for various control applications by doing experiments and thereby able to comprehend and summarize the evaluation. (PO10) Able to engage in lifelong learning of choosing controllers for any physical system by using MATLAB/ Simulink for various control applications(PO12) Apply knowledge(PSO1), derive solutions (PSO2) and empower students for lifelong learning (PSO3) of choosing controllers for any physical system using simulation tools in MATLAB/ Simulink

EED 415	**PROJECT PHASE 1**	**L**	**T**	**P**	**CREDIT**	**Year of Introduction**
		0	0	6	2	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EED415.1	Model and solve real world problems by applying knowledge across domains	K3
EED415.2	Develop products, processes or technologies for sustainable andsocially relevant applications	K3
EED415.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks	K3
EED415.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms	K3
EED415.5	Identify technology/research gaps and propose innovative/creative solutions	K4
EED415.6	Organize and communicate technical and scientific findings effectively in written and oral forms	K3

MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	1	2	2	2	1	1	1	1	2	1	-	-
CO2	2	2	2	-	1	3	3	1	1	-	1	1	2	-	-
CO3	-	-	-	-	-	-	-	-	3	2	2	1	-	-	-
CO4	-	-	-	-	2	-	-	3	2	2	3	2	-	3	-
CO5	2	3	3	1	2	-	-	-	-	-	-	1	2	3	-
CO6	-	-	-	-	2	-	-	2	2	3	1	1	-		
AVG	2	2	2	1	2	3	3	2	2	2	2	1	2	3	-

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Mode rate/High)	JUSTIFICATION
EED415.1-PO1	2	Apply the knowledge of mathematics, science, engineering fundamentals to solve real world problems
EED415.1-PO2	2	Model and solve real world problems by applying problem analysis
EED415.1-PO3	2	Design solutions for real world problems by applying engineering knowledge
EED415.1-PO4	1	Solve real world problems by the use of research-based knowledge and research methods
EED415.1-PO5	2	Apply appropriate techniques, resources, and modern engineering and IT tools to solve real world problems
EED415.1-PO6	2	Model and solve real world problems by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities
EED415.1-PO7	2	Model and solve real world problems and find engineering solutions in societal and environmental contexts
EED415.1-PO8	1	Model and solve real world problems by committing to professional ethics and responsibilities
EED415.1-PO9	1	Model and solve real world problems as an individual, and as a member or leader in diverse teams
EED415.1-PO10	1	Model and solve real world problems and communicate effectively on complex engineering activities with the engineeringcommunity and with society
EED415.1-PO11	1	Apply project management to model and solve real world problems
EED415.1-PO12	2	Model and solve real world problems and get a chance to life longlearning.

EED415.1-PSO1	1	Model and solve real world problems to design, commission and maintain various types of electrical systems
EED415.2-PO1	2	Apply the knowledge of mathematics, science, engineering fundamentals to develop products, processes or technologies for sustainable and socially relevant applications
EED415.2-PO2	2	Develop products, processes or technologies for sustainable and socially relevant applications by conducting problem analysis
EED415.2-PO3	2	Develop products, processes or technologies for sustainable andsocially relevant applications by applying engineering knowledge
EED415.2-PO5	1	Apply appropriate techniques, resources, and modern engineering and IT tools to develop products, processes or technologies
EED415.2-PO6	3	Develop products, processes or technologies for sustainable and socially relevant applications by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities
EED415.2-PO7	3	Develop products, processes or technologies for sustainable and socially relevant applications in societal and environmental contexts
EED415.2-PO8	1	Develop products, processes or technologies with professional ethics and responsibilities
EED415.2-PO9	1	Develop products, processes or technologies for sustainable and socially relevant applications as an individual, and as a member or leader in diverse teams
EED415.2-PO11	1	Apply project management to develop products, processes or technologies for sustainable and socially relevant applications
EED415.2-PO12	1	Develop a chance to lifelong learning from developing products, processes or technologies for sustainable and socially relevant applications
EED415.2-PSO1	2	Develop products, processes or technologies to design, commission and maintain various types of electrical systems
EED415.3-PO9	3	Function effectively to solve real world problems as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
		Model and solve real world problems and communicate

EED415.3-PO10	2	effectively on complex engineering activities with the engineering community and with society
EED415.3-PO11	2	Apply project management to function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
EED415.3-PO12	1	Execute designated tasks as a team and get lifelong learning.
EED415.4-PO5	2	Plan and execute tasks utilizing available resources with modern engineering and IT tools to solve real world problems
EED415.4-PO8	3	Plan and execute tasks by committing to professional ethics and responsibilities
EED415.4-PO9	2	Utilize available resources within timelines to execute tasks as an individual, and as a member or leader in diverse teams
EED415.4-PO10	2	Plan and execute tasks and communicate effectively to the engineering community and with society
EED415.4-PO11	3	Apply project management to plan and execute tasks utilizing available resources within timelines, to model and solve real world problems
EED415.4-PO12	2	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms and experience lifelong learning.
EED415.4-PSO2	3	Derive sustainable solutions, plan and execute tasks to solve complex electrical engineering problems utilizing available resources within timelines that meet the specified needs with ethical, social and environmental considerations.
EED415.5-PO1	2	Apply the knowledge of mathematics, science, engineering fundamentals to identify technology/research gaps and propose innovative/creative solutions
EED415.5-PO2	3	Identify technology/research gaps and propose innovative/creative solutions by applying problem analysis
EED415.5-PO3	3	Propose technology/research gaps by applying engineering knowledge
EED415.5-PO4	1	Develop innovative/creative solutions by the use of research-based knowledge and research methods
EED415.5-	2	Apply appropriate techniques, resources, and modern engineering and IT tools to Identify technology and propose creative solutions

PO5		
EED415.5-PO12	1	Identify technology/research gaps and propose innovative/creative solutions and experience lifelong learning.
EED415.5-PSO1	2	Identify technology and propose innovative/creative solutions to design, commission and maintain various types of electrical systems
EED415.5-PSO2	3	Apply technology and propose innovative/creative solutions that meet the specified needs of the society with ethical, social and environmental considerations.
EED415.6-PO5	2	Apply appropriate techniques, resources, and modern engineering and IT tools to organize technical and scientific findings effectively in written and oral forms.
EED415.6-PO8	1	Express technical and scientific findings effectively in written and oral forms by committing to professional ethics and responsibilities
EED415.6-PO9	1	Derive technical and scientific findings effectively in written and oral forms as an individual, and as a member or leader in a group
EED415.6-PO10	1	Effectively organize and communicate technical and scientific findings effectively in written and oral forms to the engineering community and with society
EED415.6-PO11	1	Apply project management to arrange technical and scientific findings effectively in written and oral forms
EED415.6-PO12	2	To get lifelong learning experience, organize and communicate technical and scientific findings to the engineering society

8

EET 402	ELECTRICAL SYSTEM DESIGN AND ESTIMATION	L	T	P	CREDIT	Year of Introduction
		2	1	0	3	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET402.1	Explain the rules and regulations in the design of components for medium and high voltage installations	K2
EET402.2	Design lighting schemes for indoor and outdoor applications	K3
EET402.3	Design low/medium voltage domestic and industrial electrical installations.	K3
EET402.4	Design, testing and commissioning of 11 kV transformer substation.	K3
EET402.5	Design electrical installations in high rise buildings.	K3

MAPPING

PO CO	Programme Outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	3	1	2	-	-	1	-	2	-	-	-	-	3	1	-
CO2	3	2	3	-	-	1	1	1	-	-	-	1	3	1	1
CO3	3	1	3	-	-	1	-	1	-	-	-	1	3	1	1
CO4	3	1	3	-	-	1	-	1	-	-	1	1	3	1	1
CO5	3	1	3	-	-	1	1	1	-	-	-	1	3	1	1

JUSTIFICATION

CO	PO	LEVEL	REMARKS
	PO 1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying the rules and regulations in the design of components for medium and high voltage installations.
	PO 2	1	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with the rules and regulations in the design of components for medium and high voltage installations
	PO 3	2	Students will be able to 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 –these are correlated to the rules and regulations in the design of components for medium and high voltage installations
	PO 6	1	Students will be able to apply reasoning informed by thecontextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in in the design of components for medium and high voltage installations.

	PO 8	2	Students will be able to apply ethical principles and committo professional ethics and responsibilities and norms of the engineering –correlated to rules and regulations in the design of components for medium and high voltage installations.
	PSO 1	3	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field in medium and high voltage installations.
	PSO 2	1	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in connection with rules and regulations in the design of components for medium and high voltage installations.
CO 2	PO 1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while designing lighting schemes for indoor and outdoor applications
	PO 2	2	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with design lighting schemes for indoor and outdoor applications
	PO3	3	Students will be able to 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 –these are correlated to the design lighting schemes for indoor and outdoor applications
	PO6	1	Students will be able to apply reasoning informed by thecontextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice in the design of lighting schemes for indoor and outdoor applications

	PO7	1	Students will be able to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development in the design lighting schemes for indoor and outdoor application
	PO8	1	Students will be able to apply ethical principles and committo professional ethics and responsibilities and norms of the engineering –correlated to the design lighting schemes for indoor and outdoor application
	P O 12	1	Get lifelong learning while designing lighting schemes for indoor and outdoor applications
	PS O 1	3	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field while design lighting schemes for indoor and outdoor application
	PS O 2	1	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in the design of lighting schemes for indoor and outdoor application
	PS O 3	1	Students will be able to get lifelong learning in the design oflighting schemes for indoor and outdoor application
CO 3	PO 1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while designing low/medium voltage domestic and industrial electrical installations
	PO 2	1	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with design low/medium voltage domestic and industrial electrical installations
	PO 3	3	Students will be able to 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 –these are correlated to the design low/medium voltage domestic and industrial electrical installations
	PO 6	1	Students will be able to 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 in the design low/medium voltage domestic and industrial electrical installations
	PO 8	1	Students will be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering –correlated to the design low/medium voltage domestic and industrial electrical installations
	PO 12	1	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field to design low/medium voltage domestic and industrial electrical installations
	PSO 1	3	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field while design low/medium voltage domestic and industrial electrical installations
	PSO 2	1	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in the design of low/medium voltage domestic and industrial electrical installations
	PSO 3	1	Students will be able to get lifelong learning in the design oflow/medium voltage domestic and industrial electrical installations
	PO 1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while designing, testing and commissioning of 11 kV transformersubstation

CO 4	PO 2	1	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with design, testing and commissioning of 11 kV transformer substation
	PO3	3	Students will be able to 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 –these are correlated to the design, testing and commissioning of 11 kV transformer substation
	PO6	1	Students will be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legaland cultural issues and the consequent responsibilities relevant to the professional engineering practice in the design, testing and commissioning of 11 kV transformer substation
	PO8	1	Students will be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering –correlated to the design, testing and commissioning of 11 kV transformer substation
	P O 11	1	Students will be able to 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 in connection with design, testing and commissioning of 11 kV transformer substation
	P O 12	1	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field to design, testing and commissioningof 11 kV transformer substation
	PS O 1	3	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field while design, testing and
			commissioning of 11 kV transformer substation
	PS O 2	1	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in the design, testing and commissioning of 11 kV transformer substation

	PSO 3	1	Students will be able to get lifelong learning in the design, testing and commissioning of 11 kV transformer substation
CO 5	PO 1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while designing electrical installations in high rise buildings
	PO 2	1	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with design electrical installations in high rise buildings
	PO3	3	Students will be able to 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 –these are correlated to the design electrical installations in high rise buildings
	PO6	1	Students will be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legaland cultural issues and the consequent responsibilities relevant to the professional engineering practice in the design electrical installations in high rise buildings
	PO7	1	Students will be able to understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development in the design of electrical installations in high rise buildings
	PO8	1	Students will be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering –correlated to the design electrical installations in high rise buildings
	PO 12	1	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address
			challenges in the field to the design electrical installations in high rise buildings
	PSO 1	3	Students will be able to apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field while design electrical installations in high rise buildings

	PSO 2	1	Students will be able to derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations in the design of electrical installations in high rise buildings
	PSO 3	1	Students will be able to get lifelong learning in the design ofelectrical installations in high rise buildings

EET 424	ENERGY MANAGEMENT	L	T	P	CREDIT	Year of Introduction
		2	1	0	3	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET424.1	Analyse the significance of energy management and auditing.	K2
EET424.2	Discuss the energy efficiency and management of electrical loads.	K2
EET424.3	Apply demand side management techniques.	K2
EET424.4	Explain the energy management opportunities in industries.	K3
EET424.5	Compute the economic feasibility of the energy conservation measures.	K3

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EET424.1	2					1	1		1				2	2	
EET424.	2		1	1		1	1						2	2	

Signed By:Devassia V P
Date:14.09.2023 19:21

2															
EET424.3	2		1	1		1	1						2	2	
EET424.4	2		1	1		1	1						2	2	
EET424.5	2										2		2	2	
Average	**2**		**0.6**	**0.6**		**0.8**	**0.8**		**0.2**		**0.4**		**2**	**2**	

JUSTIFICATION

CO	PO/ PSO	Mapping	Justification
EET424.1	PO1	2	Students will be able to analyse the significance of energy management and auditing.
	PO6	1	Students will be able to apply reasoning based on significance of energy management and auditing for the responsibilities relevant to the professional engineering practice.
	PO7	1	Students will be able to understand the significance of energy management and auditing in societal and environmental contexts for sustainable development.
	PO9	1	Students will be able to work effectively as an individual, and as a member or leader in energy audit team.
	PSO1	2	Students will be able to apply the engineering knowledge on significance of energy management and auditing.
	PSO2	2	Students will be able to derive solutions to problems related to the significance of energy management and auditing at various institutions.
EET424.2	PO1	2	Students will be able to describe the energy efficiency and management of electrical loads.
	PO3	1	Students will be able to design system components based on the energy efficiency and management of electrical loads.
	PO4	1	Students will be able to provide valid conclusions regarding complex engineering based problems based on energy efficiency and management of electrical loads.
	PO6	1	Students will be able to apply reasoning based on the energy efficiency and management of electrical loads for the responsibilities relevant to the professional engineering practice.
	PO7	1	Students will be able to impart the knowledge of energy efficiency and management of electrical loads in societal and environmental contexts for sustainable development.
	PSO1	2	Students will be able to apply the engineering knowledge on energy efficiency and management of electrical loads.

	PSO2	2	Students will be able to derive solutions to problems related to energy efficiency and management of electrical loads at various institutions.
EET424.3	PO1	2	Students will be able to describe the demand side management techniques.
	PO3	1	Students will be able to design system components based on demand side management techniques.
	PO4	1	Students will be able to provide valid conclusions regarding complex engineering based problems based on demand side management techniques.
	PO6	1	Students will be able to apply reasoning based on demand side management techniques for the responsibilities relevant to the professional engineering practice.
	PO7	1	Students will be able to impart the knowledge of demand side management techniques in societal and environmental contexts for sustainable development.
	PSO1	2	Students will be able to apply the engineering knowledge on demand side management techniques.
	PSO2	2	Students will be able to derive solutions to problems related to demand side management techniques at various institutions.
EET424.4	PO1	2	Students will be able to describe the energy management opportunities in industries.
	PO3	1	Students will be able to design system components based on energy management opportunities in industries.
	PO4	1	Students will be able to provide valid conclusions regarding complex engineering based problems based on energy management opportunities in industries.
	PO6	1	Students will be able to apply reasoning based on energy management opportunities in industries for the responsibilities relevant to the professional engineering practice.
	PO7	1	Students will be able to impart the knowledge of energy management opportunities in industries in societal and environmental contexts for sustainable development.
	PSO1	2	Students will be able to apply the engineering knowledge on energy management opportunities in industries.
	PSO2	2	Students will be able to derive solutions to problems related to energy management opportunities in industries.
EET424.5	PO1	2	Students will be able to compute the economic feasibility of the energy conservation measures.
	PO11	2	Students will be able to analyse the techno-economic feasibility of various energy conservation measures as a member or a leader of energy audit team.
	PSO1	2	Students will be able to apply the engineering knowledge on economic feasibility of the energy conservation measures.
	PSO2	2	Students will be able to derive solutions to problems related to economic feasibility of the energy conservation measures.

EET 468	INDUSTRIAL INSTRUMENTATION AND AUTOMATION	L	T	P	CREDIT	Year of Introduction
		2	1	0	3	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET468.1	Identify the sensors/transducers suitable for industrial applications.	K2
EET468.2	Design the signal conditioning circuits for industrial instrumentation and automation.	K2
EET468.3	Analyze the concepts of data transmission and virtual instrumentation related to automation	K2
EET468.4	Develop the logic for the process control applications using PLC programming	K2
EET468.5	Describe the fundamental concepts of DCS and SCADA systems	K2

MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	-	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	2	2	2	-
CO3	3	1	-	-	-	-	-	-	-	-	-	2	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	2	2	2	-
CO5	3	1	-	-	-	-	-	-	-	-	-	2	-	-	-
AVG	3	1	-	-	-	-	-	-	-	-	-	2	2	2	-

Signed By:Devassia V P
Date:14.09.2023 19:21

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
EET 468.1-PO1	3	In depth engineering knowledge in sensors/transducers suitable for industrial applications.
EET 468.1-PO2	1	Analyze sensors/transducers suitable for industrialapplications.
EET 468.1-P012	2	Get lifelong learning from the design and selection of sensors/transducers for industrial applications.
EET 468.2-PO1	3	In depth engineering knowledge in signal conditioning circuits for industrial instrumentation and automation.
EET 468.2-PO2	1	Analyze signal conditioning circuits for industrial instrumentation and automation.
EET 468.2-P012	2	Get lifelong learning from the design and selection of signal conditioning circuits.
EET 468.2-PSO1	2	Develop the signal conditioning circuits to design, commission and maintain various types of electrical systems
EET 468.2-PSO2	2	Develop sustainable solution to signal conditioning circuits for industrial instrumentation and automation.
EET 468.3-PO1	3	In depth engineering knowledge in the concepts of data transmission and virtual instrumentation related to automation
EET 468.3-PO2	1	Analyze the concepts of data transmission and virtual instrumentation related to automation
EET 468.3-P012	2	Analyze the concepts of data transmission and virtual instrumentation to get lifelong learning.
EET 468.4-PO1	3	In depth engineering knowledge in the development of the logic for the process control applications using PLC programming
EET 468.4-PO2	1	Analyze the process control applications using PLC programming
EET 468.4-P012	2	Develop the logic for the process control applications using PLC programming and acquire lifelong learning.
EET 468.4-PSO1	2	Develop the logic for the process control applications using PLC programming to design, commission and maintain various types of electrical systems
EET 468.4-	2	Develop sustainable solution to process control

PSO2		applications using PLC programming
EET 468.5-PO1	3	In depth engineering knowledge in the fundamental concepts of DCS and SCADA systems
EET 468.5-PO2	1	Analyze the fundamental concepts of DCS and SCADA systems
EET 468.5-P012	2	Get lifelong learning from the design of DCS and SCADAsystems.

EET 426	SPECIAL ELECTRICAL MACHINES	L	T	P	CREDIT	Year of Introduction
		2	1	0	3	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET426.1	Analyse the performance of different types of permanent magnet motors	K3
EET426.2	Analyse the performance of a stepper motor	K3
EET426.3	Analyse the performance of different types of reluctance motors	K3
EET426.4	Explain the construction and principle of operation of servo motors, single phase motors and linear motors	K2
EET426.5	Analyse the performance of linear induction motors	K3

MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	2	-	-	-	-	-	2	2	2	-
CO2	3	2	-	-	-	2	-	-	-	-	-	2	2	2	-

CO3	3	2	-	-	-	2	-	-	-	-	-	2	2	2	-
CO4	3	2	-	-	-	2	-	-	-	-	-	2	2	2	-
CO5	3	2	-	-	-	2	-	-	-	-	-	2	2	2	-
AVG	3	2	-	-	-	2	-	-	-	-	-	2	2	2	-

JUSTIFICATION

	(Low/ Moderate/ High)	
CO1-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying the performance of different types of permanent magnet motors.
CO1-PO2	2	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences.
CO1-P06	2	Able to 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 in connection with permanent magnet motors
CO1-PO12	2	Get lifelong learning from the performance of different types of permanent magnet motors
CO1-PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design various types of Permanent Magnet Motors
CO1-PSO2	2	Students will be able to analyse and solve electrical engineering problems in connection with working principle, types ofpermanent magnet motors.
CO2-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying the performance of different types of stepper motors.
CO2-PO2	2	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences.
CO2-PO6	2	Able to 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 in connection with stepper motors
CO2-P012	2	Get lifelong learning from the performance of different types of stepper motors
CO2-PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design various types of Stepper Motors

CO2-PSO2	2	Students will be able to analyse and solve electrical engineering problems in connection with working principle, types of stepper motors.
CO3-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying the performance of different types of reluctance motors.
CO3-PO2	2	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with reluctance motors
CO3-PO6	2	Able to 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 in connection with reluctance motors
CO3-P012	2	Get lifelong learning from the performance of different types of reluctance motors
CO3-PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design various types of Reluctance Motors
CO3-PSO2	2	Students will be able to analyse and solve electrical engineering problems in connection with working principle, types ofReluctance motors.
CO4-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying the performance of different types of servo motors, single phase motors and linear motors
CO4-PO2	2	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with servo motors, single phase motors and linear motors
CO4-PO6	2	Able to 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 in connection with servo motors, single phase motors and linear motors
CO4-P012	2	Get lifelong learning from the performance of different types of servo motors, single phase motors and linear motors
CO4-PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design various types of servo motors, single phase motors and linear motors
CO4-PSO2	2	Students will be able to analyse and solve electrical engineering problems in connection with working principle, types of servo motors, single phase motors and linear motors
CO5-PO1	3	Students will be able to apply the knowledge of mathematics, science, Engineering fundamentals while studying the performance of linear induction motors
CO5-PO2	2	Students will be able to analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with performance of linear induction motors

CO5-PO6	2	Able to 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 in connection with performance of linear induction motors
CO5-PO12	2	Get lifelong learning from the performance of linear induction motors
CO5-PSO1	2	Students will be able to apply knowledge of mathematics, science and engineering to design linear induction motors
CO5-PSO2	2	Students will be able to analyse and solve electrical engineering problems in connection with working principle, performance of linear induction motors

EED 416	PROJECT PHASE II	L	T	P	CREDIT	Year of Introduction
		0	0	12	4	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EED416.1	Model and solve real world problems by applying knowledge across domains	K3
EED416.2	Develop products, processes or technologies for sustainable andsocially relevant applications	K3
EED416.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks	K3
EED416.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms	K3
EED416.5	Identify technology/research gaps and propose innovative/creative solutions	K4
EED416.6	Organize and communicate technical and scientific findings effectively in written and oral forms	K3

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	1	2	2	2	1	1	1	1	2	1	-	-
CO2	2	2	2	-	1	3	3	1	1	-	1	1	2	-	-
CO3	-	-	-	-	-	-	-	-	3	2	2	1	-	-	-
CO4	-	-	-	-	2	-	-	3	2	2	3	2	-	3	-
CO5	2	3	3	1	2	-	-	-	-	-	-	1	2	3	-
CO6	-	-	-	-	2	-	-	2	2	3	1	1	-		
AVG	2	2	2	1	2	3	3	2	2	2	2	1	2	3	-

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
EED416.1-PO1	2	Apply the knowledge of mathematics, science, engineering fundamentals to solve real world problems
EED416.1-PO2	2	Model and solve real world problems by applying problem analysis
EED416.1-PO3	2	Design solutions for real world problems by applying engineering knowledge
EED416.1-PO4	1	Solve real world problems by the use of research-based knowledge and research methods
EED416.1-PO5	2	Apply appropriate techniques, resources, and modern engineering and IT tools to solve real world problems

EED416.1-PO6	2	Model and solve real world problems by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities
EED416.1-PO7	2	Model and solve real world problems and find engineering solutions in societal and environmental contexts
EED416.1-PO8	1	Model and solve real world problems by committing to professional ethics and responsibilities
EED416.1-PO9	1	Model and solve real world problems as an individual, and as a member or leader in diverse teams
EED416.1-PO10	1	Model and solve real world problems and communicate effectively on complex engineering activities with the engineeringcommunity and with society
EED416.1-PO11	1	Apply project management to model and solve real world problems
EED416.1-PO12	2	Model and solve real world problems and get a chance to life longlearning.
EED416.1-PSO1	1	Model and solve real world problems to design, commission and maintain various types of electrical systems
EED416.2-PO1	2	Apply the knowledge of mathematics, science, engineering fundamentals to develop products, processes or technologies for sustainable and socially relevant applications
EED416.2-PO2	2	Develop products, processes or technologies for sustainable and socially relevant applications by conducting problem analysis
EED416.2-PO3	2	Develop products, processes or technologies for sustainable andsocially relevant applications by applying engineering knowledge
EED416.2-PO5	1	Apply appropriate techniques, resources, and modern engineering and IT tools to develop products, processes or technologies
EED416.2-PO6	3	Develop products, processes or technologies for sustainable andsocially relevant applications by the contextual knowledge to assess societal, health, safety, legal and cultural issues and theconsequent responsibilities
EED416.2-PO7	3	Develop products, processes or technologies for sustainable and socially relevant applications in societal and environmental contexts
EED416.2-PO8	1	Develop products, processes or technologies with professional ethics and responsibilities

EED416.2-PO9	1	Develop products, processes or technologies for sustainable and socially relevant applications as an individual, and as a member or leader in diverse teams
EED416.2-PO11	1	Apply project management to develop products, processes or technologies for sustainable and socially relevant applications
EED416.2-PO12	1	Develop a chance to lifelong learning from developing products, processes or technologies for sustainable and socially relevant applications
EED416.2-PSO1	2	Develop products, processes or technologies to design, commission and maintain various types of electrical systems
EED416.3-PO9	3	Function effectively to solve real world problems as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
EED416.3-PO10	2	Model and solve real world problems and communicate effectively on complex engineering activities with the engineering community and with society
EED416.3-PO11	2	Apply project management to function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
EED416.3-PO12	1	Execute designated tasks as a team and get lifelong learning.
EED416.4-PO5	2	Plan and execute tasks utilizing available resources with modern engineering and IT tools to solve real world problems
EED416.4-PO8	3	Plan and execute tasks by committing to professional ethics and responsibilities
EED416.4-PO9	2	Utilize available resources within timelines to execute tasks as an individual, and as a member or leader in diverse teams
EED416.4-PO10	2	Plan and execute tasks and communicate effectively to the engineering community and with society
EED416.4-PO11	3	Apply project management to plan and execute tasks utilizing available resources within timelines, to model and solve real world problems
EED416.4-PO12	2	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms and experience lifelong learning.
EED416.4-PSO2	3	Derive sustainable solutions, plan and execute tasks to solve complex electrical engineering problems utilizing available resources within timelines that meet the specified needs with ethical, social and environmental considerations.
EED416.5-PO1	2	Apply the knowledge of mathematics, science, engineering fundamentals to identify technology/research gaps and

		proposeinnovative/creative solutions
EED416.5-PO2	3	Identify technology/research gaps and propose innovative/creative solutions by applying problem analysis
EED416.5-PO3	3	Propose technology/research gaps by applying engineering knowledge
EED416.5-PO4	1	Develop innovative/creative solutions by the use of research-based knowledge and research methods
EED416.5-PO5	2	Apply appropriate techniques, resources, and modern engineering and IT tools to Identify technology and propose creative solutions
EED416.5-PO12	1	Identify technology/research gaps and propose innovative/creative solutions and experience lifelong learning.
EED416.5-PSO1	2	Identify technology and propose innovative/creative solutions to design, commission and maintain various types of electrical systems
EED416.5-PSO2	3	Apply technology and propose innovative/creative solutions thatmeet the specified needs of the society with ethical, social and environmental considerations.
EED416.6-PO5	2	Apply appropriate techniques, resources, and modern engineering and IT tools to organize technical and scientific findings effectively in written and oral forms.
EED416.6-PO8	1	Express technical and scientific findings effectively in written and oral forms by committing to professional ethics andresponsibilities
EED416.6-PO9	1	Derive technical and scientific findings effectively in written and oral forms as an individual, and as a member or leader in a group
EED416.6-PO10	1	Effectively organize and communicate technical and scientific findings effectively in written and oral forms to the engineering community and with society
EED416.6-PO11	1	Apply project management to arrange technical and scientific findings effectively in written and oral forms
EED416.6-PO12	2	To get lifelong learning experience, organize and communicatetechnical and scientific findings to the engineering society

EET 404	COMPREHENSIVE COURSE VIVA	L	T	P	CREDIT	Year of Introduction
		1	0	0	1	2019

COURSE OUTCOMES

CO	Course outcome	Knowledge level
EET404.1	Analyse electrical circuits, signal processing methods and different linear and non-linear control system techniques.	K2
EET404.2	Understand the fundamentals of analog and digital electronics, power electronic converters and its applications, and microprocessor/microcontroller programming.	K2
EET404.3	Analyse the performance of DC machines, transformers, induction and synchronous machines with fundamentals ofelectromagnetics.	K2
EET404.4	Understand the fundamentals of electrical power generation, transmission, distribution, measurements, power system analysisand electrical system design.	K2

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EET404.1	3	3	1									2	2	2	2
EET404.2	2	2	2	1								2	2	2	2
EET404.	2	2	2			2						2	2	2	

3															
EET404.4	2	1	2			1	1	1			1	1	2	1	1
Average	2.25	2	2	1		1.5	1	1			1	1.75	2	1.75	1.25

JUSTIFICATION

CO	PO/ PSO	Mapping	Justification
EET404.1	PO1	3	An in-depth knowledge of mathematics and electrical engineering.
	PO2	3	Analyse DC and AC electric networks and basic operations on signals and systems.
	PO3	1	Able to conduct time domain analysis, frequency domain analysis and stability analysis.
	PO12	2	Analyse advanced control methods for modelling and stability analysis of linear and nonlinear systems.
	PSO1	2	Apply knowledge of two port network used in various applications.
	PSO2	2	Derive solutions of stability analysis in control system techniques.
	PSO3	2	Empower students for lifelong learning for the analysis of three phase circuits in power system.
EET404.2	PO1	2	An in-depth knowledge of mathematics and power electronics.
	PO2	2	Analysis of AC voltage controllers and inverters using basic principles of mathematics and engineering sciences.
	PO3	2	Design and Analysis of Buck, Boost, Buck-Boost converter circuits for various applications.
	PO4	1	Design and analysis of analog and digital electronic circuits.
	PO12	2	Ability to engage in lifelong learning of programming of microprocessor and microcontroller for various applications.
	PSO1	2	Apply knowledge of microprocessor and microcontroller.
	PSO2	2	Derive solutions of analog and digital electronics for various applications.
	PSO3	2	Empower students for lifelong learning for power electronic applications in power system.
EET404.3	PO1	2	Describe the operation and performance of electrical machines.
	PO2	2	Analyse the induction motor using the performance characteristics.
	PO3	2	Design system components based on the performance of Alternator.
	PO6	2	Apply reasoning based on performance of transformer for the responsibilities relevant to the professional engineering practice.

	PO12	2	Able to have lifelong learning with technological changes in performance of electrical machines.
	PSO1	2	Apply the engineering knowledge on electromagnetics for analyzing the performance of electrical machines.
	PSO2	2	Derive solutions to problems related to the operation and performance of synchronous and induction machines..
EET404.4	PO1	2	apply the knowledge of mathematics, science, Engineering fundamentals of electrical power generation, transmission and distribution.
	PO2	1	analyze complex engineering problems using first principles of mathematics, natural sciences, and Engineering sciences in connection with operation and construction of basic instruments for measurement of electrical quantities.
	PO3	2	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 –these are correlated to the design lighting schemes for indoor and outdoor applications
	PO6	1	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 in the design low/medium voltage domestic and industrial electrical installations
	PO7	1	understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development in the design of electrical installations in high rise buildings
	PO8	1	apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field to design low/medium voltage domestic and industrial electrical installations
	PO11	1	able to 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 in connection with design, testing and commissioning of 11 kV transformer substation
	PO12	1	Knowledge of analyzing the steady state and transient stability of power system networks is required to equip electrical engineers for lifelong learning
	PSO1	2	Knowledge of analyzing the active and reactive power flow of a power system network is required to design and maintain various systems in electrical engineering.
	PSO2	1	Knowledge of scheduling the optimal generation scheme for a power system is required find solutions to complex electrical engineering problems

	PSO3	1	Knowledge of per unit systems and faults in the system is required to equip electrical engineers for lifelong learning

9

OUTCOME BASED EDUCATION

ST.JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY, PALAI

Department of Electrical and Electronics Engineering

1. Mission:

Mission Statement

Develop technically competent, emotionally strong and socially committed Electrical & Electronics Engineering professionals of international excellence.

2. Vision:

Vision Statement

- To develop and maintain a conducive infrastructure and learning-environment, to bring out good quality Electrical & Electronics Engineering graduates.
- To appoint and retain a team of competent, dedicated and research oriented faculty.
- To inculcate ethical & moral values among students and faculty.

3. Title of the Program (s):

Electrical and Electronics Engineering

4. Program Educational Objectives:

PEO-I: Career: Graduates will identify, analyze, design, install, maintain and operate on electrical engineering products and systems to provide solution in complex electrical fields.

PEO-II: Technical: Graduates will be a life-long learner of state of the art technology through collaboration with industry and academia.

PEO-III: Behaviour: Graduates will practice the modern technology with commitment to engineering ethics, human values and environmental sustainability.

5. Program Outcomes:

Engineering Graduates will be able to:

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 analyze 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 modeling 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 to engage in independent and life-long learning in the broadest context of technological change.

6. Course- Program outcome Matrix (Sample):

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
BE10103 Introduction to Electrical Engineering	CO1	2	1	-	-	-	-	-	-	-	-	-	-	2	-	1
	CO2	3	2	1	1	-	-	-	-	-	-	-	-	3	-	2
	CO3	3	3	2	2	1	-	-	-	-	-	-	-	3	-	2
	CO4	3	3	2	2	1	-	-	-	-	-	-	-	2	1	1
	CO5	2	1	-	-	-	-	-	-	-	-	-	-	3	1	2
	CO6	3	3	2	2	1	-	-	-	-	-	-	-	2	-	2
	Average	2.67	2.17	1.75	1.75	1	-	-	-	-	-	-	-	2.5	1	1.67

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE 201 Circuits and Networks	CO1	3	3	2	2	1	-	-	-	-	-	-	-	3	3	1
	CO2	3	2	1	1	-	-	-	-	-	-	-	-	3	3	-
	CO3	3	3	2	2	1	-	-	-	-	-	-	-	3	3	1
	CO4	3	3	2	2	1	-	-	-	-	-	-	-	3	3	1
	CO5	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-
	CO6	1	-	-	-	-	-	-	-	-	-	-	-	1	1	-
	Average	2.33	2.75	1.75	1.75	1	-	-	-	-	-	-	-	2.33	2.33	1

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE 231 ELECTRONIC CIRCUITS LAB	1	3	2	1	1	-	-	-	-	1	1	-	-	3	3	-
	2	3	2	1	1	-	-	-	-	1	1	-	-	3	3	-
	3	3	3	2	2	1	-	-	-	2	2	-	-	3	3	1
	4	3	3	2	2	1	-	-	-	2	2	-	-	3	3	1
	5	3	2	1	1	-	-	-	-	1	1	-	-	3	3	-
	6	2	1	-	-	-	-	-	-	-	-	-	-	2	2	-
	Average	2.83	2.17	1.4	1.4	1	-	-	-	1.4	1.4	-	-	2.83	2.83	1

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE 451 SEMINAR AND PROJECT PRELIMINARY	C451.1	1	1	-	-	-	-	-	-	2	-	1	-	2	1	-
	C451.2	1	2	-	2	-	-	-	-	2	-	1	-	2	1	-
	C451.3	1	2	2	-	2	-	-	-	3	3	1	-	2	1	-
	C451.4	1	1	2	-	-	-	-	-	2	-	1	-	2	1	-
	C451.5	1	2	-	2	-	-	-	-	2	-	1	-	2	1	-
	C451.6	1	1	-	-	2	-	-	-	3	3	1	-	2	1	-
	Average	1	2	2	2	2	-	-	-	2	3	1	-	2	1	-

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EE 492 PROJECT	**C492.1**	**2**	**1**	-	-	-	-	-	-	**3**	**2**	**1**	-	**2**	**1**	**1**
	C492.2	**3**	**3**	**1**	**1**	-	-	-	-	-	**1**	-	**2**	**2**	**1**	**1**
	C492.3	**3**	**2**	**3**	**1**	**3**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**1**
	C492.4	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**1**
	C492.5	**2**	**2**	**2**	**2**	**2**	-	-	-	-	-	-	-	**2**	**3**	**1**
	C492.6	**2**	-	-	-	-	-	-	-	**2**	**3**	-	-	**2**	-	**1**
	Average	2	2	2	1	2	1	1	1	2	2	1	1	2	2	1

7. Course Outcomes (for sample courses):

Course Code	Course name	CO	Statement
CY 100	Engineering chemistry	CO1	develop the fundamental concepts of electrochemical and spectroscopic techniques.
		CO2	predict the structure of chemical compounds using spectroscopic and thermal analysis techniques.
		CO3	apply modern instrumental techniques for engineering purpose.
		CO4	prepare various engineering materials and identify its applications in various fields of engineering.
		CO5	develop basic knowledge on fuels and lubricants.
		CO6	identify suitable water treatment techniques.

CY 110	Engineering chemistry lab	CO	Statement
		CO1	Develop knowledge about different types of qualitative and quantitative estimation
		CO2	Analyse the quality of water by determining its chemical parameters
		CO3	Aquire the skill for the preparation of engineering materials like polymers
		CO4	Measure the conductivity and PH of any sample thereby the purity of sample can be checked
		CO5	Understand, explain and use instrumental techniques for chemical analysis
		CO6	Develop scientific attitude by demonstrating the theoretical concepts of engineering chemistry
course code	course name	CO	Statement
EE 110	ELECTRICAL ENGINEERING WORKSHOP	CO1	Identify different types of cables,wires and other accessories used in wiring and also knew the essential energy conservation in electrical systems
		CO2	Practice simple lighting circuit wiring through PVC conduits for domestic appliances/installations
		CO3	Practice electrical power circuit wiring for industrial installations
		CO4	Measure electric circuit parameters voltage, current, power and power factor of different equipments/appliances.
		CO5	Familiarize wiring of back up power supply used in domestic installation.
		CO6	Calculate the electric tariff using energy meter readings
course code	course name	CO	Statement
ME 110	BASIC MECHANICAL ENGINEERING	CO1	Apply the basic principles of Thermodynamics in air standard cycles
		CO2	Explain the basic working principles of various energy conversion devices
		CO3	describe the working of various power transmission devices and majour automobile components

		CO4	Describe the working and applications of Refrigeration and Airconditioning Systems
		CO5	Identify various engineering materials and the manufacturing processes involved in it
		CO6	Explain the basic components of and operations performed in various machine tools
course code	course name	CO	Statement
ME 110	MECHANICAL ENGINEERING WORKSHOP	CO1	Identyfy major mechanical tools
		CO2	Understand various wooden joints
		CO3	Understanding deformation of aluminium test specimen due to forging
		CO4	Understand moulding process
		CO5	Understand various metal joining process
	course name	CO	Statement
BE 10 103	Introduction to Electrical Engineering	CO1	Understand the concept of circuit elements, their VI relations and the principle of electromagnetic induction
		CO2	Apply the principles of KVL and KCL to solve electric circuits
		CO3	Compare Electric and Magnetic circuits and solve numeric Problems
		CO4	Analyse RLC circuits with the concept of AC
		CO5	Describe the concept of power factor and resonance in electric circuits
		CO6	Analyse 3 phase circuits
course code	course name	CO	Statement
EE 492	PROJECT	CO1	Select a problem for project working as a team (k3)
		CO2	Apply the available literature on chosen problem (k3)
		CO3	Apply engineering knowledge in practical problem (k3)
		CO4	Develop creative thinking in finding viable solutions to engineering problems (k5)
		CO5	Formulate hypothesis/design/methodology/work plan of the project.(k6)

		CO6	Prepare and present report of the project work.(k5)
course code	course name	CO	Statement
EE 404	INDUSTRIAL INSTRUMENTATION & AUTOMATION	CO1	understand process control system and choice of transducers.(K2)
		CO2	understand various transducer measurements.(K2)
		CO3	explain various signal conditioning systems for transducers.(K2)
		CO4	understand about Micro Electromechanical Systems (MEMS) & Virtual instrumentation systems. (K2)
		CO5	explain about automation system and their types. (K2)
		CO6	understand the programming realization of PLC.(K2)
course code	course name	CO	Statement
EE 474	ENERGY MANAGEMENT & AUDITING	CO1	understand the Energy Management Principles and know how to plan Energy Management with clear understanding of different methodologies (k2)
		CO2	understnd Energy Management opportunities in Electrical lighting, heating and motor applications.(k2)
		CO3	understand energy use and process involved in steam boilers and know energy saving opportunities in various stages of steam generation. (k2)
		CO4	understand the process involved in HVAC systems and refrigeration with special attention to energy savings. (K2)
		CO5	know the definition, need and types of Energy audit and to understand cogeneration. (k2)
		CO6	understand the economics involved in the implementation of energy audit recommendations and cash flow studies in IRR and life cycle costing and apply the economic principles in case studies.(K2)

8. Set Target levels for Attainment of Course Outcomes:

Assessment Tool	Attainment Level			
	3	2	1	0
CIE	More than 70%of students scoring target value	More than 60%and up to 70% of students scoring target value	From50% andup to 60% of students scoring target value	Less than 50%of students scoring target value
ESE	More than 70%of students scoring target grade	More than 60%and up to 70% of students scoring target grade	From50% andup to 60% of students scoring target grade	Less than 50%of students scoring target grade
Course Exit Survey	More than 70%of students scoring target value	More than 60%and up to 70% of students scoring target value	From 50% andup to 60% of students scoring target value	Less than 50%of students scoring target value

9. Set Target level for Attainment of Program Outcomes:

The procedure for setting PO target has been decided as follows:
For every course, CO is to be mapped with each program outcome (PO) based on the relative significance. The average value of these matrix entries for each course is to be calculated upto two decimal points. Similar procedure is to be carried out for all courses and the final PO target for each PO, (PO1 to PO12) to be computed as the aggregate average of respective course wise PO averages (to be calculated up to two decimal points)

10.Course Attainment Levels:

ATTAINMENT LEVELS		
70	% or more students Score More than Set Target:	3
60	% or more students Score More than Set Target:	2
50	% or more students Score More than Set Target:	1
Less than 50% students Score More than Set Target:		0
Direct Attainment	CIE	70
	End Semester Examination	30
Co Attainment	Direct	80
	Indirect	20

11.Program attainment Level:

a. The PO attainment is based on the average attainment level of corresponding courses (Direct Method) and programme exit survey, (Indirect method);
b. The PO attainment levels are defined / set as stated below based on the recommendation from the DAC (Department Advisory Committee);
    i. Level-1: Greater than 15% and less than 30% (15%>30%)- Poor
    ii. Level-2: 30%>50%-Average
    iii. Level-3: 50%>65%-Good
    iv. Level-4: 65%>85%-Very Good
    v. Level-5: 85% or more -Excellent
c. The PO attainment target level is set/defined (say, Level-4). It implies that, the department is aiming at minimum level-4 (very good) in the performance of abilities by the graduates. Based upon the results of attainment, the remedial measures are taken;
d. PO Attainment= 80% (Average attainment level by direct method) + 20% (Average attainment level by indirect method).

12. The Results of CO Attainment:

Table No. 1.0: CO Attainment Level

Course Code	CO'S	Course Title	Target level	Attainment	Fully Attained/Not attained	Remedial measures
Be 110	CO1	Engineering graphics	3	2.16	NOT ATTAINED	PROVIDING QUESTION PAPER BANK
	CO2		3	2.24	NOT ATTAINED	VIDEO LECTURES
	CO3		3	3	ATTAINED	
	CO4		3	3	ATTAINED	
	CO5		3	3	ATTAINED	
	C06		3	2.8	NOT ATTAINED	NPTEL LECTURES
PH 100	CO1	Engineering Physics	3	1.32	NOT ATTAINED	REMEDIAL classes
	CO2		3	2.16	NOT ATTAINED	
	CO3		3	1.88	NOT ATTAINED	
	CO4		3	2.44	NOT ATTAINED	
	CO5		3	3	ATTAINED	

	C06		3	2.16	NOT ATTAINED	PROVIDING QUESTION PAPER BANK
EE 205	CO1	DC Machines and Transformer	3	1.44	NOT ATTAINED	VIDEO LECTURES
	CO2		3	0.6	NOT ATTAINED	NPTEL LECTURES
	CO3		3	1.44	NOT ATTAINED	REMEDIAL MEASURES
	CO4		3	0.6	NOT ATTAINED	
	CO5		3	2.28	NOT ATTAINED	
	C06		3	2.28	NOT ATTAINED	
HS 210	CO1	LIFE SKILS	3	2.52	NOT ATTAINED	
	CO2		3	2.52	NOT ATTAINED	
	CO3		3	2.52	NOT ATTAINED	
EE 301	**CO1**	PGTP	3	2	NOT ATTAINED	
	CO2		3	2.28	NOT ATTAINED	
	CO3		3	2.28	NOT ATTAINED	
	CO4		3	2.28	NOT ATTAINED	
	CO5		3	2.28	NOT ATTAINED	
	C06		3	0.6	NOT ATTAINED	
EE 372	**CO1**	Bio medical Instrumentation	3	2.52	NOT ATTAINED	
	CO2		3	1.12	NOT ATTAINED	
	CO3		3	2.24	NOT ATTAINED	
	CO4		3	2.52	NOT ATTAINED	
	CO5		3	2.52	NOT ATTAINED	
	C06		3	2.24	NOT ATTAINED	
EE 403	**CO1**	DISTERIBUTED GENERATION AND SMART GRIDS	3	1.44	NOT ATTAINED	
	CO2		3	1.44	NOT ATTAINED	
	CO3		3	1.44	NOT ATTAINED	
	CO4		3	2	NOT ATTAINED	

Signed By:Devassia V P
Date:14.09.2023 19:21

	CO5		3	1.44	NOT ATTAINED	
	C06		3	1.44	NOT ATTAINED	
EE 474	**CO1**	ENERGY MANAGEMENT AND AUDITING	3	1.68	NOT ATTAINED	
	CO2		3	1.68	NOT ATTAINED	
	CO3		3	1.68	NOT ATTAINED	
	CO4		3	1.68	NOT ATTAINED	
	CO5		3	1.68	NOT ATTAINED	
	C06		3	2.52	NOT ATTAINED	

13.The Results of PO Attainment:

Table No. 2.0 PO Attainment Level

2018-22 BATCH

PO/PSO number	Description of PO/PSO	Attainment level	Target level	Fully attained/ Not Attained	Remedial Measures
PO1	Engineering knowledge:	1.95	2.52	NOT ATTAINED	INDUSTRIAL VISIT
PO2	2. Problem analysis:	1.44	1.88	NOT ATTAINED	INDUSTRIAL TRAINING
PO3	3. Design/development of solutions:	1.13	1.45	NOT ATTAINED	INVITED TALKS
PO4	4. Conduct investigations of complex problems:	1.07	1.35	NOT ATTAINED	WEBINAR
PO5	5. Modern tool usage:	1.27	1.47	NOT ATTAINED	CO-CURRICULAR ACTIVITIES
PO6	6. The engineer and society:	1.46	1.63	NOT ATTAINED	
PO7	7. Environment and sustainability:	1.32	1.3	ATTAINED	
PO8	8. Ethics:	1.23	1.5	NOT ATTAINED	
PO9	9. Individual and team work:	1.74	2.04	NOT ATTAINED	

PO10	10. Communication:	1.58	1.85	NOT ATTAINED	
PO11	11. Project management and finance:	1.2	1.33	NOT ATTAINED	
PO12	12. Life-long learning:	1.27	1.63	NOT ATTAINED	
PSO1	Apply knowledge of mathematics, science and engineering to design, commission and maintain various types of electrical systems and address challenges in the field.	1.7	2.17	NOT ATTAINED	
PSO2	Derive sustainable solutions to complex electrical engineering problems that meet the specified needs with ethical, social and environmental considerations.	1.63	2.08	NOT ATTAINED	
PSO3	Adapt to changing work culture with ability for lifelong learning.	0.91	1.09	NOT ATTAINED	

14. Planned Actions for Course Attainment:

PROVIDING QUESTION PAPER BANK
VIDEO LECTURES
NPTEL LECTURES
REMEDIAL MEASURES

15.Planned Actions for Program Outcome Attainment:

INDUSTRIAL VISIT
INDUSTRIAL TRAINING
INVITED TALKS
WEBINAR
CO-CURRICULAR ACTIVITIES

Signed By:Devassia V P
Date:14.09.2023 19:21

Signed By:Devassia V P
Date:14.09.2023 19:21