SHRI G.S. INSTITUTE OF TECHNOLOGY & SCIENCE

DEPARTMENT OF ELECTRICAL ENGINEERING

SESSION : 2018-19

Vision & Mission of Department

Vision

To develop leading expertise in Electrical Engineering field making significant contribution to human resource development envisaging dynamic needs of the societyand industries

Mission

To produce higher levels of human resources in the field of Electrical Engineering for Nation's accelerated socio-economical and technological growth in emerging areas of human endeavour

Program Educational Objectives (PEOs)

PEO_1 :To impart core knowledge of Electrical Engineering for technical careers.

PEO_2: To teach the advanced aspects of Electrical systems along with its design,simulation and fabrication together with good communication skills.

PEO_3 : To motivate students for higher studies in Electrical Engineering so as to develophigh vision in the technical career.

PEO_4 :To attain professional excellence through lifelong learning.

PEO_5 :To produce graduates to ensure ethical & moral behaviour.

Programme Specific Outcomes (PSOs)

PSO#1: Demonstrate fundamental knowledge of mathematics, science and engineering to identify, formulate, analyse, investigate and solve complex problems in the field of electrical engineering.

PSO#2 : Apply the appropriate techniques and modern engineering tools to design and develop complex electrical engineering projects, adapt in multi-disciplinary environments and engage in life-long learning.

PSO#3 :Propose & implement engineering solutions in the context of environment, society, economy, professional ethics and have good communication skills.

Programme Outcomes (POs):

PO#1 : Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering

PO#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.

PO#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

PO#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.

PO#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.

PO#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.

PO#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.

PO#8 :. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO#9 :Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

PO#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

PO#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.

PO#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.

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH FIRST YEAR (4 YDC)
EE10005: FUNDAMENTALS OF ELECTRICAL ENGINEERING

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	20	30	150

PRE- REQUISITE: Basic knowledge of science and mathematics at XII level**.**

COURSE OBJECTIVES:

1. To acquaint students with the basic concepts, elements and properties of electrical circuits and networks.
2. To introduce the concept of phasor and power factor improvement in sinusoidal steady-state analysis.
3. To explain basics of magnetic circuit and its practical aspects.
4. To impart the knowledge of a three-phase system- its generation and analysis.
5. To teach students the basic principles of operation, construction, modelling and application of static and rotating electrical machines.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EE10005(T).1: Apply knowledge of science and mathematics to explain electrical circuit component characteristics, formulate various circuit describing mathematical models using basic circuit laws and select appropriate solution technique to find dc/ac excitation responses.

EE10005(T).2: Utilize ac excited steady state circuit analysis concepts in real life problems such as need of power factor correction, power factor improvement methods and home energy distribution system.

EE10005(T).3: Carry out practical magnetic circuit calculations and performance analysis of single phase transformer.

EE10005(T).4: Analyze three phase power generation system and perform basic analysis of three phase star/delta circuits.

EE10005(T).5:Do performance analysis of various type of motors and develop ability to identify suitable motor for particular application.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		-	-	-	-	-	-	-	-	-
CO2	3	3	1	-	-	1	1	-	-	-	-	-
CO3	3	3	-	-	3	-	-	-	-	-	-	–
CO4		3	1	1	-	-	-	-	-	-	-	-
CO5	3	3	-	1	3	-	-		-	-	-	-
Average	3	3	1	1	3	1	1	-	-	-	-	-

LABORATORY:

OBJECTIVES: The fundamental of Electrical engineering Laboratory is designed

1. To provide the student with the knowledge to use basic measuring instruments techniques and equipments such as motors, transformers etc with proficiency.
2. In this lab, students are expected to get hands-on experience in using the basic measuring devices used in electrical engineering and in interpreting the results of measurement operations.
3. To develop communication skill through laboratory note book with written descriptions of procedure, result and analysis.
4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1. Visualize constructional features of AC and DC machines by observing cut section of machines; examine characteristics of motor and generator.
2. Determine experimentally circuit parameters of a coil, measure real power in variable load circuit and interpret the importance of power factor.
3. Classify measuring instrument class of accuracy and tell significance of symbols mentioned on their dial. Select appropriate type and range of measuring instrument for a particular experimental setup on motors and transformer based on their name plate ratings.
4. Determine resistance of a colour coded resistor and verify the value by measurement; differentiate the characteristics of resistance with different temperature coefficient and verify the Ohm's law and Kirchoff's laws.
5. Experimentally validate the turn ratio with name plate rating and determine efficiency of single phase transformer at varying load and plot efficiency v/s load curve.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	3	-	-	-	-	-	3	-	-
CO2	-	3	-	-	3	-	-	-	-	3	-	-
CO3	3	3	-	3	3	3	-	-	-	3	-	3
CO4	3	3	-	-	-	-	-	-	-	3	-	-
CO5	-	3	-	3	-	-	-	-	-	3	-	-
Average	3	3	-	3	3	3	-	-	-	3	-	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM A (4 YDC)
EE22004: ELECTRICAL MEASUREMENT & INSTRUMENTATION

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Fundamental of Electrical Engineering, Physics.

COURSE OBJECTIVES:

1. To introduce students to monitor, analyze and control any physical system.
2. To understand students how different type of meters work with their construction.
3. To provide a brief knowledge of measurements and measuring instruments related to engineering.
4. To impart the knowledge of sensors and different types of AC and DC transducers.
5. To teach students basic principle of operation, construction, and application of recording devices, such as CRO, X-Y plotters etc.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE22004(T).1: Interpret various characteristics and errors in the measuring instruments.

EE22004(T).2: Select and calibrate specific instrument for the purpose of measurement of different electrical quantities.

EE22004(T).3: Measure unknown impedance using AC/DC bridges and potentiometers.

EE22004(T).4: Make use of transducer and signal conditioning in order to measure unknown electrical and physical quantities.

EE22004(T).5: Demonstrate the application of CRO'S and DSO'S in the research and development activities in domain of electrical engineering.

CO-PO MAPPING:

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

LABORATORY:

OBJECTIVES: The fundamental of Electrical engineering Laboratory is designed:

1. To provide the student with the knowledge to use basic measuring instruments techniques and equipments such as motors, transformers etc with proficiency.
2. In this lab, students are expected to get hands-on experience in using the basic measuring devices used in electrical engineering and in interpreting the results of measurement operations.
3. To develop communication skill through laboratory note book with written descriptions of procedure, result and analysis.
4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1. Identify the various parameters measurable in the electrical instruments that can be calibrated to rectify the errors.
2. To carry out experiments for determining the unknown quantities in the electrical instruments using different Bridge circuits.
3. Explore the constructions of various meters for the electrical systems.
4. To have an understanding about the CRO, DSO, and Transducers.
5. To construct the meaning from oral, written, and graphical plotting through the experiments.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	3	-	-	-	-	-	3	-	-
CO2	-	3	-	-	3	-	-	-	-	3	-	-
CO3	3	3	-	3	3	3	-	-	-	3	-	3
CO4	3	3	-	-	-	-	-	-	-	3	-	-
CO5	-	3	-	3	-	-	-	-	-	3	-	-
Average	3	3	-	3	3	3	-	-	-	3	-	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM A (4 YDC)
EC22002: ANALOG ELECTRONICS

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Basic Electronics and Engineering

COURSE OBJECTIVES:

This course introduces the characteristics and applications of semiconductor devices and circuits. Emphasis is placed on analysis, selection, biasing, and applications.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EC22002(T).1: Develop the capability to analyze and design simple circuits containing different types of diodes.

EC22002(T).2: Design circuits based on BJT and FET transistors with their different configurations to operate them in desired modes.

EC22002(T).3: Analyze and design of amplifiers and their cascade with the help of small signal models BJT and FET.

EC22002(T).4: Improve amplifier performance by employing different feedback topologies and design various frequency generators.

EC22002(T).5: Use OP-AMP to design linear and nonlinear circuits.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	1	2	-	-	-	-	-	-	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-
Average	3	3	2	2.5	-	-	-	-	-	-	-	-

LABORATORY:

OBJECTIVES:

The fundamental of Analog Electronics engineering Laboratory is designed

1. To provide the student with the knowledge to use basic measuring instruments techniques and equipments such as function generator, CRO etc with proficiency.

2. In this lab, students are expected to get hands-on experience in using the basic measuring devices used in electronics engineering and in interpreting the results of measurement operations.

3. To develop communication skill through laboratory note book with written descriptions of procedure, result and analysis.

4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1. Study the nonlinear characteristics of different types of Diodes and their applications experimentally.
2. Develop competence in frequency response analysis of single amplifiers.
3. Develop competence in frequency response analysis of multistage amplifiers.
4. Measure frequency of various oscillators.
5. Design and experiment OP-AMP based linear and nonlinear circuit.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	1	2	-	-	-	-	-	-	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-
Average	3	3	2	2.5	-	-	-	-	-	-	-	-

ELECTRICAL ENGINEERING DEPARTMENT
B. TECH SECOND YEAR SEM A (4 YDC)
EE22006: NETWORK THEORY

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTAL MARKS
						CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Fundamental of electrical engineering, mathematics**.**

COURSE OBJECTIVES:
The objective of the course is to familiarize the students with the analysis, characterization and elementary synthesis of networks and develop a basic understanding of various components under transient and steady state conditions. This helps in designing of real life applications.
The objectives include equipping students with:

1. The fundamental concepts of current; voltage and power along with the properties of passive circuit elements as well as network theorems.
2. Designing of various types of filters, transient and steady state response of various circuits, two- port network and state space variable analysis.
3. Illustrate the magnetically coupled circuits, Analysis of balanced and unbalanced polyphase circuits.
4. Knowledge of attenuators, equalizers, Fourier series and its frequency spectrum.

COURSE OUTCOMES:

After completing the subject student will be able to:

EE22006(T).1: Apply the knowledge of basic physics and mathematics to develop approximate circuit model of practical elements. Formulation of circuit equations using Kirchhoff's law and network topology.

EE22006(T).2: Apply the network reduction techniques and network theorems to obtain solution of network.

EE22006(T).3: Infer and evaluate transient response, steady state response in time and frequency domain, determine different network functions and analyze the series and parallel resonant circuit.

EE22006(T).4: Analysis of polyphase circuits, neutral shift concept and power factor improvement.

EE22006(T).5: Develop and evaluate two-port model and its parameters, design attenuators, filters and equalizers.

CO - PO MAPPING:

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

LABORATORY:

OBJECTIVES: the network theory laboratory is designed

1. To access and use the most basic functions of electrical test and measurement equipment including oscilloscopes, multi-meters, function generators and power supplies.
2. Work effectively in groups by sharing responsibilities and collaborating on findings.
3. Record and document results of lab work using text and graphs.
4. Test circuits, analyze data and compare measured performance to theory and simulation.

LABORATORY OUTCOMES:

1. Analyze complicated circuits using different network theorems.
2. Apply the knowledge of basic circuital law and simplify the network.
3. Infer and evaluate transient response, Steady state response, and network functions.
4. Obtain the maximum power transfer to the load, and analyze the series resonant and parallel resonant circuit.
5. Evaluate two port network model and its parameters.

CO-PO MAPPING:

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

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B. TECH. SECOND YEAR SEM A (4YDC) ELECTRICAL ENGINEERING

MA22014: MATHEMATICS – III

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	1	3	-	1	30	70	-	-	100

PRE –REQUISITES: Mathematics-I and Mathematics-II.

COURSE OBJECTIVES

1. To explain the concept of partial differential equation with its application.
2. To introduce the concept of Fourier series and Fourier Transform with their applications.
3. To teach the concept of Laplace Transform and its application in solving ordinary differential equations.
4. To solve the problems related to algebra, differential calculus and integral calculus using numerical analysis.

COURSE OUTCOMES

On completion of the course, students will be able to

MA22014(T).1: Apply the basic concept of partial differential equations for solving some physical problems in engineering models that result in partial differential equations.

MA22014(T).2: Acquire the knowledge of Fourier analysis and its applications to solve the problems in physics and electrical engineering.

MA22014(T).3: Use the fundamental concept of Laplace Transform, Inverse Laplace Transform and its applications to solve engineering applications such as circuit analysis and control theory.

MA22014(T).4: Analyze the basic concept of finite differences for solving problems based on numerical interpolation, differentiation, integration. Formulation and evaluation of difference equations.

MA22014(T).5: Apply various numerical methods to solve algebraic, transcendental and simultaneous equations.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	-	-	-	-	3
CO2	3	3	3	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	-	-	-	-	-	-	-	3
CO4	3	3	3	-	-	-	-	-	-	-	-	3
CO5	3	3	3	-	-	-	-	-	-	-	-	3
Average	3	3	3	-	-	-	-	-	-	-	-	3

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
B.TECH. SECOND YEAR SEM A (4YDC)
HU22005: ECONOMICS FOR ENGINEERS

HOURS PER WEEK			CREDITS		MAXIMUM MARKS				
L	T	P	Th	Pr	THEORY		PRACTICAL		TOTAL MARKS
					CW	END SEM	SW	END SEM	
3	-	-	3	-	30	70	-	-	100

PRE REQUISITES: Knowledge of English language

OBJECTIVES:

1. To develop the optimizing skills of technology-use in engineering problems
2. To articulate economic analytical skills so as to contextualize the solutions of engineering problems.
3. To explore the potential of students in economic perspective of engineering professional goals.
4. To make sense of need of entrepreneurship and understand the financial reports of a business.

COURSE OUTCOMES:

After completion of course, the students will be able to:

HU22005 (T).1: Explain economic cyclic flow and Estimate the demand and demand elasticity for a product.

HU22005 (T).2: Plan the production; choose appropriate production technology (combination of production factors); and estimate feasible range of production.

HU22005 (T).3: Analyze the production-cost-profit relation and select the suitable project for investment

HU22005 (T).4: Estimate price and the equilibrium for a firm/organization in different competitive market situations.

HU22005 (T).5: Review, summarize and compare the financial statements of an accounting entity and able to apply financial ratio technique for financial analysis.

HU22005 (T).6: Identify the problems, see the opportunity, and ideate the solution to the problems

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12
CO1	-	-	-	-	-	1	-	-	-	-	2	-
CO2	-	-	-	-	-	1	1	-	-	-	3	-
CO3	-	-	-	-	-	-	1	-	-	-	3	-
CO4	-	-	-	-	-	-	1	-	-	-	2	-
CO5	-	-	-	-	-	-	-	2	-	-	3	-
CO6	-	-	-	-	-	1	1	1	-	-	3	-
Average	-	-	-	-	-	**1.0**	**1.0**	**1.5**	-	**0.0**	**2.7**	-

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM A (4 YDC)
EE22443: ELECTRICAL WORKSHOP-I

HOURS PER WEEK			CREDIT			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
-	4	-	-	2	-	-	-	40	60	100

OBJECTIVES: The Electrical workshop –I laboratory is designed.

1. The main objective is to make the students able to understand, design and prepare electrical
   circuit using basic concept.
2. To focus on Electrical safety and equipment earthing.
3. To address the underlying concepts of wiring of various electrical installation.
4. In this lab, students are expected to get hands-on experience in using the electrical tools
   and develop communication skills through manual with written descriptions of procedure,
   result and analysis.

LABORATORY OUTCOMES:

The student will able to:

1. To get acquainted with various tools, symbols used in the electrical system.
2. Prepare estimate for electrical wiring in the domestic applications.
3. Provide effective earthing solution in domestic as well as industrial domain.
4. Suggest suited illumination devices as per application requirement.
5. Repair and maintain electrical appliances and make robust joint in electrical connection.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR, SEM B (4 YDC)
EE22501: ELECTRICAL MACHINES-I

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	S W	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Fundamentals of electrical engineering.

COURSE OBJECTIVES:

1. To get the basic understanding of transformer operation and working principle.
2. Estimation of various performance parameters of the transformer through different tests.
3. Introduction to auto transformer, 3-phase transformer and per unit calculations.
4. Understanding of rotating magnetic field and operation of induction motor as transformer.
5. Complete understanding of DC machines.
6. To provide students a deep insight about the constructional, working and practical aspects of Synchronous machines.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EE22501 (T).1: Interpret the nameplate rating of the transformer & distinguish between two winding transformers and auto transformer.

EE22501 (T).2: Categorize three phase transformers based on Phasor groups and select the conversion scheme for the application.

EE22501 (T).3: Select DC machine for various applications and identify the cause of failure of voltage build up in dc generators.

EE22501 (T).4: Estimate motor rating, various currents, efficiency, etc. experimentally and determine the equivalent circuit model of the induction motor under different operating conditions.

EE22501 (T).5: Demonstrate the effect of changing torque and excitation on characteristics of a synchronous generator using circuit model and Phasor diagram.

CO-PO MAPPING:

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

LABORATORY:

OBJECTIVES: The Electrical Machines-I Laboratory is designed:-

1. To provide the student with the knowledge of various electrical machines, measuring instruments, equipment such as dc motors, three phase and single phase induction motors, generators and transformers etc. with proficiency.
2. In this lab, students are expected to get hands-on experience of operating large electrical machines and in interpreting the results of measurement operations.
3. To develop communication skills through laboratory notebook with written descriptions of procedure, result and analysis.
4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1: Determine equivalent circuit parameter by conducting tests and use it for estimating its performance.

2: Categorise three phase transformers on the basis of various connection schemes.

3: Employ phase conversion techniques to get desired three to two phase supply from available three phase supply.

4: Apply appropriate speed control techniques to get the desired speed range of the dc shunt motor & predict the efficiency of the machine without loading it.

5: Illustrate the various characteristics of self & separately excited DC generators.

6: Analyze the operating characteristics of SCIM for different loading conditions and compute the three phase power applied to it.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR, SEM B (4 YDC)
EE22502: ELECTROMAGNETIC FIELDS & MATERIALS

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	1	4	-	-	30	70	-	-	100

PRE- REQUISITE: Physics and Fundamental of electrical engineering.

COURSE OBJECTIVES:

1. To explain the basic fundamentals of electric and magnetic fields culminating in Maxwell's equations & their applications.
2. To impart the knowledge of magnetic field intensity and associated quantities in free space & magnetic materials.
3. To accomplish the different aspects of time varying fields and electromagnetic waves.
4. Provide the students of Electrical Engineering with a clear and logical presentation of the basic concepts & principles of electromagnetism.
5. To acquaint students with the concepts of Transmission line and its design for lossy and lossless mediums.

COURSE OUTCOMES: After completing this course, the student will be able to

EE22502(T).1: Develop the understanding of basic Electro-magnetic laws and Effectively utilize the significance of operations such as curl, divergence, gradient as well as Del and Laplacian operators.

EE22502(T).2: Utilize Poisson's and Maxwell's equations for determination and analysis of various engineering problems in sorting boundary conditions between dielectrics.

EE22502(T).3: Select suitable conducting, insulating and magnetic materials for various applications. Identify and formulate the phenomenon of electromagnetic wave propagation in different media via calculations of skin depth, energy flow, and dielectric loss estimation at various temperatures to determine exact estimations of wave propagation properties.

EE22502(T).4: Acquire knowledge of different semiconductor materials, conductors and metals, their properties for electromagnetic field applications.

EE22502(T).5: Identify and remove inconsistency in basic electric and magnetic field equations for Lossless transmission of EM waves using Maxwell's equations.

EE22502(T).6: Develop the concepts of absorption, reflection and refraction for wave propagation in deep and congested areas through simulation software.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT

B.TECH. SECOND YEAR, SEM B (4 YDC)

EC22562: DIGITAL ELECTRONICS

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Engineering. Physics, Basic Electronics

COURSE OBJECTIVES:

1. To acquire the basic knowledge of digital logic levels and application of knowledge tounderstand digital electronics circuits.
2. To impart how to design Digital Circuits.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EC22562(T).1: Acquire knowledge about the number systems, codes, Boolean algebra, basic logic gates and simplify digital circuits.

EC22562(T).2: Synthesize and design small combinational circuits and use standard combinational functions/building blocks to build larger more complex circuits.

EC22562(T).3: Design and develop sequential logic circuits and understand data storage elements.

EC22562(T).4: Analyze digital integrated circuits and employ these ICs to build larger more complex circuits.

EC22562(T).5: Analyze and design multivibrators and ADC & DAC converters to convert rea lworld analog signals to digital and vice versa.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	2	2	2	1	-	-	-	-	-	-	-	-
CO5	3	3	2	1	-	-	-	-	-	-	-	-
Average	**2.6**	**2.4**	**2**	**1.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

LABORATORY:

OBJECTIVES:

- To know the concepts of Combinational circuits.
- To understand the concepts of flip-flops, registers and

counters The fundamental of Digital Electronics engineering

Laboratory is designed

1. To provide the student with the knowledge to use logic gates and Flip-flop, registers, counters and their applications in electronics circuits.
2. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.
3. The practical experience gained by the student in the laboratory will be useful in designing more complex circuits, fault detection and testing of existing circuits etc.
4. In this lab, students are expected to get hands on experience, confidence in making minor and major projects, developing faults diagnosis skill & reconfirming the fundamental principles of basic electronics.
5. To develop communication skill through laboratory note book with written descriptionsof procedure, result and analysis.

LABORATORY OUTCOMES:

EC22562(P).1: Learn the basics of gates and implement logic functions.

EC22562(P).2: Construct basic combinational circuits such as arithmetic circuits, code converter circuits and parity generator & checker and verify their functionalities.

EC22562(P).3: Learn about Magnitude Comparator and multiplexers.

EC22562(P).4: Apply the design procedures to design basic sequential circuits

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
Average	**2.8**	**2.5**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

DEPARTMENT OF APPLIED MATHEMATICS AND COMPUTATIONAL SCIENCE

B. TECH. SECOND YEAR SEM B (4YDC)

MA22563: MATHEMATICS-IV

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	100
3	-	1	4	-	-	30	70	-	-	

PRE –REQUISITES: Mathematics – I, Mathematics-II and Mathematics – III

COURSE OBJECTIVES

1. To introduce the basic theory of complex variables and its applications.
2. To incorporate knowledge of random variables, its distributions and stochastic process with markov chain.
3. To impart the knowledge of reliability for improving the quality of manufacturing components.
4. To acquire the knowledge of different types of graphs and various algorithms.

COURSE OUTCOMES

On completion of this course, students are able to

MA22563(T).1: Apply the basic concepts of complex variables and identify various techniques to solve problems in electric field and fluid dynamics.

MA22563(T).2: Acquaint with the notion of probability theory, random variables and probability distribution function in one and two dimensions.

MA22563(T).3: Utilize the theory of stochastic process, especially markov processes and the applications of markov models in various fields.

MA22563(T).4: Acquire the knowledge of reliability and maintainability for quality improvement of manufactured products and components.

MA22563(T).5: Analyze the basic concepts of graph theory and algorithms to solve real life problems.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	-	-	-	-	-	-	3
CO2	3	3	3	3	-	-	-	-	-	-	-	3
CO3	3	3	3	3	-	-	-	-	-	-	-	3
CO4	3	3	3	3	-	-	-	-	-	-	-	3
CO5	3	3	3	3	-	-	-	-	-	-	-	3
Average	3	3	3	3	-	-	-	-	-	-	-	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. SECOND YEAR SEM B (4YDC)
EE22841: ELECTRICAL WORKSHOP & DESIGN-II

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	100
-	4	-	-	2	-	-	-	40	60	

PRE- REQUISITE: Fundamentals of Electrical Engineering.

COURSE OBJECTIVES:

1. Students would be able to identify tools, symbols & Abbreviations & Various Lamps.
2. Students would be able to understand the importance of different types of wiring.
3. Students will learn the basic repairing process of domestic appliances.
4. Improvement in ability to work in team, resource management, documentation.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE22442(P).1: Design and implement a simple real life project using microcontroller.
EE22442(P).2: Give professional presentation to discuss the progress of the project.
EE22442(P).3: Work in a group and develop leadership quality.
EE22442(P).4: Generate technical documents and reports.

CRITERIA AND RUBRICS

INTERNAL ASSESMENT:

Maximum Marks: 40 Marks

Student will be judged using following criteria and rubrics:

S.No.	Criteria	Marks	CO
1	Literature survey	10	CO1
2	Proposed Design	10	CO2
3	Leadership Developed	10	CO3
4	Organisation of Report	10	CO4

EXTERNAL ASSESMENT:

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S.No.	Criteria	Marks	CO
1	Learning outcome	5	CO3
2	Presentation	10	CO2
3	Technical Knowledge	20	CO1, CO2
4	Results	20	CO4
5.	Confidence	5	CO3

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	1	1	-	-	-	-	-
CO2	-	-	-	-	2	1	-	-	-	3	-	3
CO3	-	-	-	-	-	1	-	-	3	3	-	-
CO4	-	-	-	-	-	-	-	1	3	-	2	-
Average	**3**	**3**	**3**	**2**	**2**	**1**	**1**	**1**	**3**	**3**	**2**	**3**

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
B.TECH. SECOND YEAR SEM B (4YDC)
HU22881: VALUES, HUMANITIES AND PROFESSIONAL ETHICS

HOURS PER WEEK			CREDITS		MAXIMUM MARKS				
L	T	P	Th	Pr	Theory		Practical		Total marks
					CW	End SEM	SW	End SEM	
-	3	-	2	-	100	-	-	-	100

PRE REQUISITES: Knowledge of English language

COURSE OBJECTIVES:-

1. To make students understand of his/her social responsibility as an engineer.
2. To create an awareness on Engineering Ethics, Indian constitution and Human Values
3. To make students capable of doing self-exploration and recapitulation
4. To make students aware of the global problems

COURSE OUTCOMES:

After completion of course, the students will be able to:

HU 22881(T).1: Explain and elaborate the social institutions and Constitution of India through which the society andnation is governed.

HU 22881(T).2: Describe the kinds of values and ethics and their importance

HU 22881(T).3: Contextualize the professional attitude and approaches as per needs of society and values.

HU 22881(T).4: Explain and illustrate the process of Social, Political and Technological changes in context to globalchanges

CO- PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	1	3	2	-	-	1
CO2	-	-	-	-	-	3	-	3	2	1	-	1
CO3	-	1	-	-	-	3	3	3	2	1	-	1
CO4	-	-	-	-	-	2	3	3	2	1	-	1
Average	**-**	**1.0**	**-**	**-**	**-**	**2.5**	**2.3**	**3.0**	**2.0**	**1.0**	**-**	**1.0**

ELECTRICAL ENGINEERINGDEPARTMENT

B.TECH. THIRD YEAR SEM A (4 YDC)

EE32009:CONTROL SYSTEM

HOURSPERWEEK			CREDITS		MAXIMUMMARKS				
					THEORY		PRACTICAL		TOTALMARKS
L	P	TU	T	P	CW	END SEM	SW	END SEM	
3	2	-	3	1	30	70	40	60	200

COURSEOBJECTIVE:

1. Mathematical tools to develop control systems model, time and frequency responses of dynamical systems along with their performance specifications.
2. Techniques for determining stability of systems.
3. Basic design aspects of various controllers and compensators.
4. Dynamical system analysis using state space model.

COURSEOUTCOME:

After completing the subject, the students will be able to:

EE32009(T).1: Develop mathematical models using block diagram and SFG of various physical systems.

EE32009(T).2: Analyze the feedback control system in time domain and design various controllers for enhancing its performance.

EE32009(T).3: Determine stability of a control system using time domain techniques and design appropriate controller for given problem.

EE32009(T).4: Propose alternate solutions via compensator design to get desired frequency domain specifications.

EE32009(T).5: Apply concepts of controllability and observability as well design of state feedback controller.

CO-PO MAPPING:

CO'S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	2	-	-	-	-	-	-	-
CO2	3	3	3	3	2	-	-	-	-	-	-	-
CO3	3	3	3	3	2	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	1	1	1	-	-	-	-	-	-	-
Average	**3**	**3**	**2.6**	**2.6**	**2**	-	-	-	-	-	-	-

EE32009 : Control System Laboratory

Laboratory Objective:

1.The students will be able to use the laboratory techniques, tools and practices of control engineering.

2.To familiarize with the modelling of dynamical system and the characteristics of control components like servo motor, synchros.

3.To understand time and frequency responses of control system with and without controllers and compensators.

4.To simulate and analyse the stability using MATLAB software and design the compensators.

Laboratory Outcomes:

After completing the laboratory, the students will be able to:

EE32009(P).1: Analyze the performance for closed loop DC motor and obtain its characteristics.

EE32009(P).2: Evaluate the error and compare different error detectors according to their performance requirement in control systems.

EE32009(P).3: Determine the performance characteristics and speed control of various servo motors.

EE32009(P).4: To create the optimal results by using different types of controller for systems of first and second order systems.

EE32009(P).5: Analyzing various modern tools and evaluating steady state error with various inputs.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERINGDEPARTMENT

B.TECH. THIRD YEAR SEM A (4 YDC)

EE32005:MICROPROCESSORS&OPERATINGSYSTEM

HOURSPERWEEK			CREDITS			MAXIMUMMARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTALMARKS
						CW	ENDSEM	SW	ENDSEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Basic knowledge of digital electronics is required**.**

COURSE OBJECTIVES:

Microprocessor is the fundamental course for graduate students in the engineering program. The purpose of this course is to get acquainted with the fundamentals of microprocessor systems. This course discuss about the basics of micro-operations, architecture and internal organization of Intel 8-bit microprocessor 8085. The Main memory system design and Input-Output interfacing forms an essential part for practical implementation of the concepts in embedded system design. For programming concepts, software model, assembly and machine language programming are explored. Students will be able to demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor. Furthermore, different peripheral devices and their interfacing is discussed for real time applications. The structure, function and architecture of computers are introduced. Besides this, it also serves knowledge on characteristics of modern computer systems.

COURSE OUTCOMES:
After Completing this course student will able to

EE32005(T).1: Explore the internal organization and architecture of 8-bit microprocessor and peripheral devices.
EE32005(T).2: Impart the knowledge about the data handling and interfacing techniques for memory and I/Os.
EE32005(T).3: Develop simple programs for 8-bit microprocessor based system.
EE32005(T).4: Demonstrate the basic operations and internal structure of Operating Systems.
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CO-POMAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	1	-	-
CO3	-	2	3	-	3	-	-	-	-	-	-	-
CO4	-	2	-	1	-	1	-	-	-	-	-	-
Average	**2**	**2**	**3**	**1**	**3**	**1**	-	-	-	**1**	-	-

LABORATORY:

OBJECTIVES: The Microprocessor and operating systems Laboratory is designed:

1. To develop programs to implement algorithms of engineering problems.
2. In this lab, students are expected to get hands-on experience in using hardware and software simulators for 8085.
3. To develop communication skill through laboratory note book with written descriptions of code, flowchart and results.
4. To get exposure for various interfacing techniques.

LABORATORY OUTCOMES:

The students will be able to:

1. Design an interface to connect to Memory.
2. Develop capability for designing and documenting simple programs to implement algorithms of engineering problems.
3. Illustrate the various applications of microprocessors.
4. Give professional presentation to discuss the progress of the project.

CO-POMAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	1	1	1	-	-	-	-	1	-	1
CO2	3	3	3	3	3	-	-	-	-	2	-	2
CO3	3	3	*3*	3	-	3	3	-	2	2	-	2
CO4	3	3	3	2	2	1	1	1	2	2	2	2
Average	2.5	2.5	2.5	2.25	2	2	2	1	2	1.75	2	1.75

ELECTRICAL ENGINEERING DEPARTMENT

B.TECH. THIRD YEAR SEM A (4 YDC)

EE32007:POWER ELECTRONICS-I

HOURSPERWEEK			CREDITS			MAXIMUMMARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTALMARKS
						CW	ENDSEM	SW	ENDSEM	
3	2	-	3	1	-	30	70	40	60	200

PRE-REQUISITE: Basic knowledge of Electronics and semiconductor devices.

COURSEOBJECTIVE:

1. Toprovidestudentsadeepinsightintotheoperationalbehaviorofpracticalpower switching devices with respect to their static and dynamic characteristics
2. To learn the working principle of classified topologies of Thyristor based AC/DC andAC/AC converters.
3. Todesignandanalyzetheoperationofaboveconvertersconsideringtheirapplications.
4. TounderstanddesignoffiringcircuitsforThyristorbasedlinecommutatedconverters.

COURSEOUTCOME:

Students will be able to:

EE32007(T).1: Recognize and apply fundamental concepts of static switches in design of switching converters.

EE32007(T).2: Classify topologies of single phase and three phase line commutated power converter circuits, analyse their performances and apply in selection of appropriate converter for field problem.

EE32007(T).3: Apply the knowledge of synchronization, isolation and firing pulse generation in developing firing schemes for line commutated converters.

EE32007(T).4: Demonstrate the knowledge of Dual Converters technology in applying speed control schemes of DC machines.

EE32007(T).5: Identifythetopologiesofcyclo-convertersandACvoltagecontrollers, compare their performances for real time applications.

CO-POMAPPING:

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

LABORATORY:

OBJECTIVES: Following are the objective of the course:

1. Show awareness about operating behaviour of various static switches used in converters.
2. Understand the basic requirements in design of power converters.
3. Analyse performance parameters of various power converters.

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LABORATORY OUTCOMES:

Students will be able to

EE32007(P).1: Recognize the functions of CRO, identify and select proper instruments to observe and record performance on different experimental set ups of power electronics laboratory.

EE32007(P).2: Establish wiring and device connections to assemble experiments of static switches, line commutated converters and record their performances.

EE32007(P).3: Analyze and compare the performance of various firing pulse generation circuits for triggering of SCR.

EE32007(P).4: Apply professional quality textual and graphical tools to sketch and computing results, incorporating accepted data analysis and synthesis methods, mathematical software, and word-processing tools.

EE32007(P).5: Group activities in terms of mini projects to demonstrate the creativity and ability to interact effectively on a social and interpersonal level, divide up and share task responsibilities to complete assignments.

CO-POMAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH THIRD YEAR (4 YDC)
EE32008: ELECTRICAL MACHINES-II

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2		3	1		30	70	40	60	200

PRE- REQUISITE: Fundamentals of electrical engineering and Electrical Machines-I.

COURSE OBJECTIVES:

1. To provide basic understanding of salient pole synchronous machines. Study of short circuit ratio, sequence reactance and slip test.
2. To provide the basic knowledge about working of two alternators in parallel and load sharing.
3. Study of three phase induction machine with unbalanced and non –sinusoidal supply
4. To provide deep insight of special motors, fractional kilowatt motors.
5. Basic understanding of an induction motor working as an induction generator and induction regulator.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EE32008 (T).1: Differentiate salient pole and cylindrical rotor synchronous machine on the basis of their circuit model, phasor diagram and power angle characteristics, and control the active reactive power of parallel connected units.

EE32008 (T).2: Distinguish between sub transient, transient and steady state and discriminate between various reactances and time constants offered by a synchronous machine under different states.

EE32008 (T).3: Analyze performance of three phase induction motor supplied with non-sinusoidal and unbalanced supply, estimate derating of induction motor and discuss functioning of slip power recovery schemes.

EE32008 (T).4: Select suitable special motor for a given application based on their characteristics and possible control techniques

EE32008 (T).5: Evaluate the performance of an induction machine operating as a generator and regulator.

CO-PO MAPPING:

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

LABORATORY:

LABORATORY:

OBJECTIVES: The Electrical Machines-II Laboratory is designed:-

1. To provide the student with the knowledge of various electrical machines, measuring instruments, equipment such as dc motors, three phase and single phase induction motors, generators and transformers etc with proficiency.
2. In this lab, students are expected to get hands-on experience of operating large electrical machines and in interpreting the results of measurement operations.
3. To develop communication skills through laboratory notebook with written descriptions of procedure, result and analysis.
4. To compare theoretical prediction with experimental results and to determine the source of any apparent differences.

LABORATORY OUTCOMES:

1. Compare the ZPF and MMF method for the determination of voltage regulation of synchronous alternators.
2. Determine the equivalent circuit parameters by conducting blocked rotor test and light run test on three phase induction motor also Judge the performance of three phase induction motor feeded with unbalanced supply.
3. Demonstrate the operation of an induction machine as a grid connected and isolated induction generator.
4. Illustrate the techniques of synchronization of alternators and develop the v curves of synchronous machines.
5. Estimate the performance of a single phase induction motor by conducting a light run test and blocked rotor test.
6. Summarize the process of determination of quadrature and direct axis reactances of a synchronous machine.

CO-POMAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT

B.TECH. THIRD YEAR SEM A (4 YDC)

EE32452: POWER APPARATUS DESGIN

HOURSPERWEEK			CREDITS			MAXIMUMMARKS				
T	P	TU	T	P	TU	THEORY		PRACTICAL		TOTALMARKS
						CW	ENDSEM	SW	ENDSEM	
-	4	-	-	2	-	-	-	40	60	100

PRE-REQUISITE: Basic knowledge of Electrical Machines

COURSE OBJECTIVES:

1. Toacquaintstudentswiththebasicdesignrequirementsofanelectricalmachine.
2. Tointroduceconceptofoutputequationanditsparameters.
3. Toteachthestudentsmagneticcircuitandcoolingconceptsforelectricalmachines.
4. Toelucidatethedesignprocedureforconventionalmachinesandpermanentmagnet machines.
5. Toexplainoptimizationinmachinedesignandtechniques.

COURSEOUTCOMES:

Aftercompletingthiscourse,thestudentwillbeableto

EE32452(P).1: Familiarizewithdetaileddesignaspectsoftransformer,inductionmotor, inductor design, electric vehicles.
EE32452(P).2: Willhaveknowledgeofselectioncriteriaofinsulating,conductingand magnetic materials.
EE32452(P).3: Willbecapable ofdevelopingelectric,magnetic andthermalequivalentcircuits of machines.
EE32452(P).4: UnderstandthebasicoperatingpointsofElectricMachines.
EE32452(P).5: GetacquaintedwiththeoptimizationconceptintheMachinedesign.

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. THIRD YEAR SEM A (4 YDC)
(ELECTIVE-I)
EE32281 UTILIZATION OF ELECTRICAL ENERGY

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	-	-	100

PRE- REQUISITE: Fundamentals of Electrical Engineering and Machine.

COURSE OBJECTIVES:

1. To impart knowledge about AC and DC electric drives, their characteristics, control and operational strategies with different types of loads, evaluation of heating and cooling curves.
2. Be acquainted with the main concept and laws of illumination and its design approach.
3. To comprehend the different issues and advantages related to electric heating & welding and its practical applications.
4. To comprehend knowledge of modern electric traction, technical specifications, mechanics of train movement, problem solving for different scenarios.
5. To estimate and evaluate power, energy and tractive-effort drawn by the electric train.
6. To explain characteristics and features of AC, DC traction motors, to elucidate speed control methods, electric braking and problem solving.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE32281(T).1: Interpret the concepts of utilization of electrical energy and will be able to choose a proper drive and select the motor power rating for the specific application.
EE32281(T).2: Have the ability to design heating and welding elements.
EE32281(T).3: Perform analysis and designing of illumination systems for various applications.
EE32281(T).4: Develop understanding of electric traction, geometric analysis of train movement and estimation of energy consumption, power drawn.
EE32281(T).5: Identification of types of traction motors for various practical application and their speed control.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1		1	3					1	1
CO2	3	1			1	3					1	1
CO3	3	1			1	3					1	1
CO4	3	1			1	3	1				1	
CO5	3				1	3	1				1	1
Average	3	1	1		1	3	1				1	1

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH THIRD YEAR (4 YDC)
EE32284: RELIABILITY ENGINEERING

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
4			4			30	70			100

PRE- REQUISITE: Basic knowledge of Network Theory , Control system and Mathematics

COURSE OBJECTIVES:

1. Encourage understanding and appreciation of learning probability and reliability theory.
2. Evolve the efficacy to develop reliability models of electrical systems.
3. Learn Modern simulation tools aiding in reliability analysis.
4. Explain the possible causes of poor reliability and suggest appropriate reliability tests and the associated failure analysis methods.
5. Apply reliability theory to assessment of reliability in engineering design.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE32284 (T).1: Demonstrate an understanding of the concepts of reliability engineering and various failure distributions.

EE32284 (T).2: Identify importance of statistical distributions for modelling failure data and the physical meanings of different parameters.

EE32284(T).3: Evolve the efficacy to develop reliability models of complicated systems and be able to analyze and interpret the data to infer reliability indices from the data.

EE32284(T).4: Estimate model mean time to failure and demonstrate an understanding of steady state and time-dependent probabilities.

EE32284(T).5: Estimate reliability and parameters for failure laws from the test data.

CO-POMAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH THIRD YEAR SEM A (4 YDC)
EE 32282: Basic Electrical Drive System (Elective-1)

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	0		3	0		30	70			100

PRE- REQUISITE: Basic knowledge of Electronics and semiconductor devices.

COURSE OBJECTIVES:

- To expose students to the operation, application and control of power conversion systems employing electric drive to cater to industrial needs.
- To familiarize the operation principles, and design of starting, braking, and speed control arrangements for electric motors and their applications.
- To provide strong foundation to asses performance of different industrial drives considering issues such as, energy efficiency, power quality, economic justification, environmental issues, and practical viabilities

COURSE OUTCOMES:

EE32282(T).1: Examine various applications in industrial and domestic areas where use of electric drives are essential
EE32282(T).2: Classify types of electric drives systems based on nature of loads, control objectives, performance and reliability
EE32282(T).3: Combine concepts of previously learnt courses such as, electrical machines, Control and power electronics to cater to the need of automations in industries.
EE32282(T).4: Select most suitable type and specification of motor drive combination for efficient conversion and control of electric power
EE32282 (T).5: Design and justify new control and power conversion schemes for implementing alternative solutions considering the critical and contemporary issues.

CO-POMAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	3	3	2	-	-	-	-	-	-	-
CO2	2	3	3	3	2	-	-	-	-	-	-	-
CO3	2	3	3	3	2	-	-	-	-	-	-	-
CO4	2	3	3	3	2	-	-	-	-	-	-	-
CO5	2	3	3	3	2	-	-	-	-	-	-	-
Average	**2**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. THIRD YEAR SEM A (4 YDC)
ELECTIVE-I
EE32283: DATA STRUCTURE AND EMBEDDED SYSTEM PROGRAMMING CONCEPT

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	-	-	100

Pre-Requisite: Basics of C programming, Basics of microprocessor

COURSE OBJECTIVE:

1. Teach to write the advance program in C.
2. Learn to develop the data structure tools for specific applications.
3. Explain the performance of efficient sorting and searching.
4. Guide to investigate the software development platform.
5. Instruct to create the embedded system for real world.

Course Outcomes (COs):

After completing the course, student will able to:

EE32283(T).1: Write advance program in C with use of dynamic memory allocation techniques.
EE32283(T).2: Develop data structure tools (stack, queue, tree & graph) for specific application.
EE32283(T).3: Perform efficient sorting and searching on a large data set.
EE32283(T).4: Explore software development platform along with code optimization and resource management.
EE32283(T).5: Create embedded system for real world with low interrupt latency and suitable software architecture.

CO-POMAPPING:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	1	3	-	-	3	2	1	-	-
CO2	-	-	2	1	3	-	-	3	1	2	-	-
CO3	-	-	2	-	3	-	-	3	1	1	-	2
CO4	1	1	-	3	3	-	1	3	2	2	3	1
CO5	3	1	2	1	2	3	3	3	3	3	3	3
Average	**2**	**1**	**2**	**2**	**3**	**3**	**2**	**3**	**2**	**2**	**1.5**	**1**

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH FOURTH YEAR (4 YDC)
EE32499: MINOR PROJECT I

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
							TH	CW	SW	Pr	Total
EE32499	MINOR PROJECT I	-	-	-	-	2	-	-	40	60	100

Course Outcomes:

After completing the Minor Project Phase I, the student will able to:

CO1: Select problem of a selected area in engineering domain.

CO2: Explore the state of art solution of the selected problem.

CO3: Apply software/hardware solution methodologies for implementation of proposed design.

CO4: Practice social and professional ethical standards and work in team for developing leadership quality.

CO5: Summarize the findings in terms of technical report.

Criteria and Rubrics

Internal Assessment

Maximum Marks: 40 Marks
Student will be judged using following criteria and rubrics:

S.no	Criteria	Marks	CO
1	Selection of Problem	5	CO1
2	Literature survey	10	CO2
3	Proposed Design	10	CO1,CO3,CO4
4	Impact on Society	5	CO4
5	Report	10	CO5

External Assessment

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S.no	Criteria	Marks	CO
1	Presentation	10	CO1, CO2,CO3
2	Organization of Thesis	20	CO5
3	Learning Outcome	10	CO3
4	Ethical Practise	5	CO4
5	Results	10	CO1,CO2, CO3
6	Confidence	5	CO1, CO4

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3											
CO3		3			3							
CO4			3	3		3		3	3	3		2
CO5									3	3	3	
Average	3	3	3	3	3	3	0	3	3	3	3	2

B.TECH FOURTH YEAR (4 YDC)

EE32481: EVALUATION OF INTERNSHIP-I

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
							TH	CW	SW	Pr	Total
EE32481	Evaluation of Internship-I	-	-	-	-	2	-	-	40	60	100

Course Outcomes:

After completing the Industrial Internship and seminar, student will able to:

CO1: Select the industry and construct the company profile in terms of structure, product, services offered with brief history and key achievement.

CO2: Asses their strength, weakness and opportunity in the selected industry.

CO3: Apply theoretical knowledge in practical situation by completing the task in given time period.

CO4: Apply time management skill to complete the task and prepare draft report of the findings.

CO5: Analyze the functioning of industry and suggest the changes for improvement of their services.

Criteria and Rubrics

Internal Assessment

Maximum Marks: 40 Marks

Student will be judged using following criteria and rubrics:

S.no	Criteria	Marks	CO
1	Learning Outcome	10	CO1, CO3, CO4
2	Time line	5	CO4
3	Leadership Developed	10	CO2, CO4
4	Organisation of Report	15	CO4, CO5

External Assessment

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S.no	Criteria	Marks	CO
1	Future Goals	5	CO5
2	Presentation	10	CO3
3	Technical Knowledge	20	CO1, CO2
4	Organisation of Report	20	CO3
5.	Confidence	5	CO4, CO5

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2			3								
CO2								2	3			
CO3	3	3	3	3	3							
CO4					3						3	2
CO5						1			3	3	3	
Average	2.5	3	3	3	3	1		2	3	3	3	2

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH THIRD YEAR (4 YDC)
EE32510: HYBRID ENERGY SYSTEMS

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
4	2		3	1		30	70	40	60	200

PRE- REQUISITE: Basic knowledge of science

COURSE OBJECTIVES:

1. Assess the seriousness of the current and future energy scenario and the role played by hybrid energy in modifying it.
2. Develop basic understanding of solar, wind, bio-gas and fuel cell energy systems.
3. Learn fundamentals of different types of energy storage systems.
4. Design the hybrid energy system in standalone and grid connected configuration.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE32510(T).1: Illustrate the sustainable future energy scenario and the role played by hybrid energy in modifying it and compare various energy storage techniques.

EE32510(T).2: Utilise electrical characteristics and interconnection employing MPPT in solar Photovoltaic energy systems.

EE32510(T).3: Elucidate the wind power output characteristics and grid connection of various generators for wind energy conversion system.

EE32510(T).4: Analyze and compare the state of the art energy solutions for Microgrid like PHES and biomass.

EE32510(T).5: Develop skills to design hybrid energy system configuration and estimate its component ratings.

CO-POMAPPING:

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

LABORATORY:

OBJECTIVES: The Hybrid Energy System Laboratory is designed

1. To provide the student with the knowledge to use design software like MATLAB with proficiency.
2. In this lab, students are expected to get hands-on experience in using the solar panels, data logger, measuring instruments and illumination sources.
3. To develop communication skill through laboratory note book with written descriptions of model, code, result and analysis.
4. To get exposure for various renewable energy sources and their output characteristics.

LABORATORY OUTCOMES:

The students will be able to:

1. Mathematically model simple solar and wind energy systems.
2. Analyze the effect of various parameters on solar and wind energy systems.
3. Determine the solar and wind power outputs under various environmental conditions.
4. Develop capability for designing and documenting simple solar and wind systems with MPPT controllers.
5. Get acquainted with the current renewable energy scenario of India and its challenges. Various schemes of government for promoting renewable energy are also explored.

CO-POMAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH THIRD YEAR SEM B (4 YDC)
EE 32509: POWER ELECTRONICS-II

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2		3	1		30	70	40	60	200

PRE- REQUISITE: Power Electronics-I

COURSE OBJECTIVES:

- To understand design of SCR commutation circuits for choppers and inverter systems.
- To learn the principle of working of quadrant based choppers, switching regulators, resonant mode switching, and single-phase / three-phase inverters.
- To explore control techniques employs for above converters and its applications.
- To define characteristics and classifications of gate/base driver circuits for Power BJT, MOSFET and IGBTs.

COURSE OUTCOMES:
Students should be able to

EE32509(T).1: Describe the operating characteristics of various silicon based controlled switches, compare, illustrate them in distinguished choppers investigations for field applications.
EE32509(T).2: Write the performance parameters of single phase and three-phase inverters, explain operating principles, list applications and solve field problems .
EE32509(T).3: Discuss limitations of linear power supply, explain switch mode power supply, classify topologies, examine performances of switching regulators and apply in field problems.
EE32509(T).4: Name common disturbances in commercial supply, outline UPS, write its applications, Outline its types and modes of operation and describe BES
EE32509(T).5: Explain the need and importance of driver circuit, Identify the challenges in driving half bridge inverter, Classifications of driver circuit and their design.

CO-POMAPPING:

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

LABORATORY:

OBJECTIVES: Following are the objective of the course:

1. Show awareness about operating behaviour of various static switches used in converters.
2. Understand the basic requirements in design of power converters.
3. Analyse performance parameters of various power converters.

LABORATORY OUTCOMES:

EE32509(P).1: Design converters and demonstrate the knowledge for sustainable & secured development.
EE32509(P).2: Establish wiring and device connection for DC-DC & DC-AC experiment setup to record, synthesis and analyze their performances.
EE32509(P).3: Design and development of commutation circuits of SCR applying electrical engineering fundamentals, observing the effect of change in passive components.

EE32509(P).4: Apply professional quality textual and graphical tools to sketch and formulate results, incorporating accepted data analysis and synthesis methods, mathematical software, and word-processing tools.
EE32509(P).5: Ability to work in individual and in group following engineering practices. Ability to interact effectively on a social and interpersonal level, divide up and share task responsibilities to complete assignments.

CO-POMAPPING:

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

ELECTRICALENGINEERINGDEPARTMENT

B.TECH. THIRD YEAR SEM B (4 YDC)
EE32571:POWERSYSTEM-I

HOURSPER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	200
3	2	-	3	1	-	30	70	40	60	

PRE- REQUISITE: Fundamentals of Electrical Engineering & Network Theory

COURSE OBJECTIVES:

1. Represent elements of a power system including generators, transmission lines, and transformers.
2. To calculate the various parameters in the Electrical Transmission System.
3. To design a Transmission and distribution electric power system.
4. To understand the factors affecting Insulators and also in Underground cables..

COURSE OUTCOMES:

After completing this course students will able to:

EE 32571(T).1: Awareness of general structure and components of the power network.
EE 32571(T).2: Elucidate the concepts of transmission line parameters and its calculations for single and three phase lines.
EE 32571(T).3: Evaluate the performance of different types of transmission lines

EE 32571(T).4: Articulate the mechanical design aspect of transmission line and examine the corona effect on overhead transmission system.

EE 32571(T).5 Impart the knowledge of insulation resistance and capacitance of single and three core underground cables.

CO-PO MAPPING:

CO'S	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	2	3	-	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	2	2	-	-	-	-	-
CO5	-	3	-	-	3	-	-	-	-	-	-	-
Average	**2**	**3**	**3**	**-**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**

LABORATORY:

OBJECTIVES:

1.To acquire software development skills and experience in the usage of standard packages necessary for analysis and simulation of power system required for its planning, operation and control.

2. Acquire skills of using Mi power software for power system tudies.

3.Acquire skills of using computer packages MATLAB coding and SIMULINK in power system studies.

LABORATORY OUTCOMES:

EE 32571(P).1: To acquire software development skills and experience in the usage of standard packages necessary for analysis and simulation of power system required for its planning, operation and control.

EE 32571(P).2: Get acquainted with 33 KV substation.

EE 32571(P).3: Line parameters calculations using MI Power software tool.

EE 32571(P).4:.Modeling of transmission lines and analysis of power flow analysis using MIPOWER.

CO-POMAPPING:

CO'S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P12
CO1	3	3	-	3	2	2	-	-	-	2	-	-
CO2	3	3	-	-	2	2	-	-	-	2	-	-
CO3	3	3	-	3	2	2	-	-	-	2	-	3
CO4	3	3	-	3	2	2	-	-	-	2	-	3
Avg.	**3**	**3**	**-**	**3**	**2**	**2**	**-**	**-**	**-**	**2**	**-**	**3**

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. THIRD YEAR SEM B (4 YDC)
(ELECTIVE-II)
EE3**: DIGITAL CONTROL SYSTEMS**

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	40	60	200

PRE- REQUISITE: Basic knowledge of LTI control system, discrete time system and Z-transformation.

COURSE OBJECTIVES:

1. To introduce the basic concepts of discrete time control system and explain the motivation, model formation and stability of digital control system .
2. To teach about the designing of digital controllers and familiarize with basics of discrete time state space equations.
3. To explain the designing concepts of observer and familiarize with MIMO system.
4. To describe the concepts of PID tuning and introduce the basic concepts of Robust control system. To impart the basic idea of PLC.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE3*[T1]**. Identify the discrete time control system and will find out stability of any digital controller.

EE3*[T2]**. Explain the SISO and MIMO control system for various applications.

EE3*[T3]**. Understand the basics of designing the digital controllers and optimal controllers for power engineering applications.

EE3*[T4]**. Analyze the basic idea of tuning the controllers and will be skilled to tune PID controllers.

EE*[T5].** List the fundamentals of robust control system for various fields like industries, aviation, automobiles etc.

CO-POMAPPING:

CO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	3	3	-	-	-	-	-	-	-	-	-
CO2	-	3	3	-	-	-	-	-	-	-	-	-
CO3	-	-	3	3	2	-	-	-	-	-	-	-
CO4	2	3	3	-	-	-	-	-	-	-	-	-
CO5	-	3	3	3	2	-	-	-	-	-	-	-
Average	**2**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

ELECTRICAL ENGINEERING DEPARTMENT
B.Tech. THIRD YEAR SEM B (4 YDC),Elective-II
EE 32603: POWER SYSTEM PLANNING

Subject Code	Subject Name	L	T	P	Th. Credit	Pr. Credit	Maximum Marks				
							TH	CW	SW	Pr	Total
EE 32603	**Power System Planning**	**3**	**-**	**2**	**3**	**1**	**70**	**30**	**40**	**60**	**200**

PRE- REQUISITE: Power System Analysis, Electric Power Generation, Transmission and Distribution.

Course Objectives:
1. The course is designed to teach load forecasting, power system planning, and power quality issues in power system.
2. It aims to arm the students with the concepts of evaluation of generation, transmission and distribution system and their impacts on system planning.
3. This course will provide the background material to prepare the student for analysing various elements that constitute the power system planning function.
4. Analyze and evaluate an electric power system for generation planning and load forecasting.
5. Execute production costing analysis and long term generation expansion plans. Course Outcomes

After completing the subject student will be able to:

EE32603(T).1: Use tools to analyze power system planning and load forecasting.
EE32603(T).2: Evaluate the significance of generation planning for power system reliability.
EE32603(T).3: Develop plan for design and calculation of distributed power system.
EE32603(T).4: Evaluate the requirement for interconnected system and expansion of power system under cost consideration and expansion obligations.
EE32603(T).5: Determine load model for reactive power planning of distributed generation system.

CO-POMAPPING:

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

LABORATORY Laboratory
Objective:

1. Study of various methods used in power system planning.
2. Understanding the principal of various power generating systems.
3. Study different forecasting methods and implement them in excel.
4. Designing of a basic power system model using MATLAB.

Laboratory Outcomes:
EE32603(P).1: Summarize the concept of power system planning using different method.
EE32603(P).2: Develop the concept of various power plant and their comparison on the performance basis.
EE32603(P).3: Evaluate the peak demand and energy requirements of system using forecasting technique with the help of IT tools.
EE32603(P).4: Design different bus system using MATLAB simulation.
EE32603(P).5: Create model for the expansion of substation.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. THIRD YEAR SEM B (4 YDC)
ELECTIVE-II
EE32605: EMBEDDED SYSTEM DESIGN

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PREREQUISITE: Microprocessor and Operating System

COURSE OBJECTIVE:

1.To enable the skill of embedded system design for domestic and industrial applications.
2. To develop the knowledge for system level programming for hardware interfacing.
3.To develop skill for enhance performance of the embedded system using various optimization techniques

COURSE OUTCOME:

After completing this course students will able to:

EE 32605 (T).1: Explain design philosophy of an embedded system.
EE 32605(T).2: Select and identify hardware and software requirement like CPU specification, Memory size, I/O interfacing, Operating system, scheduling policies, IPC etc.
EE 32605(T).3: Apply optimization techniques to improve performance of the embedded system in terms of program size, power consumption, speed etc.
EE 32605(T).4: Explain the basic operations and internal structure of real time operating systems.
EE 32605(T).5: Develop embedded system for distributed architectures, network based and Internet enabled**.**

CO-PO MAPPING:

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

LABORATORY :

OBJECTIVES: The Embedded System design Lab is designed.

This Lab emphasizes on comprehensive treatment of embedded hardware and real time operating systems along with case studies, in tune with the requirements of Industry. The objective of this Lab is to enable the students to understand embedded-system programming and apply that knowledge to design and develop embedded solutions.

LABORATORY OUTCOMES:

1: Perform market survey and user requirement analysis .

2: Design hardware and software architecture of real life problem .

3: Write technical report of the project and user manual for read reference for end users.

Lab Work :

Lab work
Design Phase : Simulation of application in Lab
Hardware design: Selection of components interconnection / interfacing circuit diagram , PCB design , fabricating and testing in Lab .
Software design: Writing program in modules and discuss the interfacing and interconnections of different modules and with Hardware.

CO-POMAPPING:

CO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	-	-	3	-	2	1	1	2	3	1	3
CO2	3	3	3	3	2	1	-	2	1	3	3	1
CO3	1	-	-	3	3	-	-	3	1	3	1	2
Average	**2**	**3**	**3**	**3**	**2**	**1**	**1**	**2**	**2**	**3**	**2**	**2**

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR SEM A (4 YDC)
EE42005: DIGITAL SIGNAL PROCESSING

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	-	-	100

PRE- REQUISITE: Basic knowledge of Network Theory, Control System and Signal & Systems.

COURSE OBJECTIVES:

1. Identification of the signals and systems.
2. How to apply the principles of discrete-time signal analysis to perform various signal operations.
3. Which principles of z-transforms to finite difference equations are applicable.
4. How the principles of Fourier transforms help to describe the frequency characteristics of discrete-time signals and systems.
5. Necessity principles of signal analysis to filtering.

COURSE OUTCOMES:

After completing this course, the student will be able to:

EE42005(T).1: Knowledge about various kinds of signals, their properties and significance.

EE42005(T).2: Ability to process the signals in time and frequency domain.

EE42005(T).3: Evaluation of System functions and frequency response by using Z-Transforms.

EE42005(T).4: Capability to design Digital FIR filters using window techniques, Fourier methods and frequency sampling techniques.

EE42005(T).5: Ability to design Digital filters from Analog filters using various techniques.

EE42005(T).6: Development of Fast Fourier Transform (FFT) algorithms for faster realization of signals and systems.

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

ELECTRICAL ENGINEERING DEPARTMENT

B.TECH. FOURTH YEAR SEM A (4 YDC)

EE 42009: POWER SYSTEM-II

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
4	2		3	1		30	70	40	60	200

PRE- REQUISITE: Power System -I

COURSE OBJECTIVES:

1. Understand the formulation of the power flow problem, and have the ability to cast any given system in this framework.
2. Solve power flow problems by application of the Newton Raphson method.
3. To provide students the knowledge of optimization techniques used in the power system and Load Frequency Control (LFC).

COURSE OUTCOMES: After completing this course , the students will able to

EE 42009(T).1 : Perform steady state power flow analysis of power system networks using load flow methods.

EE 42009(T).2: Analysis of steady state stability of single and multi-machine system.

EE 42009(T).3: Ability to build mathematical model of Automatic Generation and voltage control in modern power system.

EE 42009(T).4: Acquire in-depth knowledge of various circuits for generating high voltages for testing various apparatus and their measurement method.

EE 42009(T).5: To impart the knowledge of travelling waves on transmission lines and the Phenomenon of lighting and Protection of Devices from Lighting.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	3	-	-	-	-	-	-	1
CO2	3	3	3	-	3	1	-	-	-	-	-	1
CO3	3	3	-	-	-	-	-	-	-	-	-	1
CO4	3	3	3	-	3	-	-	-	-	-	-	1
CO5	3	3	3	-	3	1	-	-	-	-	-	1
Average	**3**	**3**	**3**	**-**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**1**

LABORATORY:

OBJECTIVES:

1. To get familiar with the MATLAB.
2. Understand the concept of admittance matrix and run the load flow by using of different load flow techniques.
3. To understand the MATLAB code of different load flow techniques.
4. Understand the MATLAB Simulink block diagram for an isolated power system and obtain frequency and power response

LABORATORY OUTCOMES:

CO1: Assemble and examine High voltage, impulse voltage generation and measurement of performance

CO2: Formulate the bus admittance matrix through MATLAB.

CO3: Perform various load flow techniques through MATLAB.

CO4: Stability analysis of single machine connected to infinite bus system.

CO5.Perform load frequency dynamics of single area and two area power system.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.Tech. FOURTH YEAR (4 YDC)
EE 42010: FAULT AND SYSTEM PROTECTION

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2	-	3	1	-	30	70	40	60	200

PRE- REQUISITE: Basic knowledge of power system, electrical machines.

COURSE OBJECTIVES:

1. To familiarize the students with various faults occurs in a power system, their analysis and mathematical calculation.
2. To realize the concept of arc initialization and arc extinction theories in circuit breakers.
3. To provide basic concepts of protective devices such as circuit breaker and relays, their working principle, construction, characteristics and design parameters.
4. Acquaint students to utilize these devices in protection of various machines such as motor, generator and transformer.

COURSE OUTCOMES: after completing the course, students will be able to

EE42010 (T).1: Develop per unit representation of power system components with computational analysis of symmetrical and unsymmetrical faults**.**

EE42010 (T).2: Comprehend arc initialization and interruption techniques with realizing construction, working principle and interpreting ratings of various circuit breakers**.**

EE42010 (T).3: Assess need of protective relaying and analyze characteristics of comparators and other protective schemes**.**

EE42010 (T).4: Explore working principle, characteristics and design parameters for different types of relays and their applications**.**

EE42010 (T).5: Apply and implement various relays for protection from faults in rotating machines, transformers and bus bars.

CO-PO MAPPING:

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

LABORATORY:

OBJECTIVES:

1. To familiar the students with practical approach to examine different faults in power system.
2. To provide knowledge on components and constructional features of relays and their applications.
3. To foster the students with various protective devices installed in power system.
4. To develop communication skill through laboratory note book with written descriptions of procedure, result and analysis.
5. To compare theoretical prediction with experimental results of sequence reactance of various machines.

LABORATORY OUTCOMES:

EE42010(P).1: Experimentally determine the sequence reactance of synchronous machines and transformers.

EE42010(P).2: Identify different components and constructional features of electromagnetic relays and apprehend their functions.

EE42010(P).3: Conduct secondary injection tests on various protective relays and find their parameters.

EE42010(P).4: Demonstrate operation and working of protective devices used in power systems.

EE42010(P).5: Analyze symmetrical and unsymmetrical faults in single phase and three phase transmission systems.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR (4 YDC)
EE 42252: POWER QUALITY

Subject Code	Subject Name	L	T	P	Th. Credits	Pr. Credits	Maximum Marks				
							TH	CW	SW	Pr	Total
EE 42252	POWER QUALITY	3	0	0	3	0	70	30	0	0	100

PRE- REQUISITE: Basic knowledge of Power System, Power Electronics.

COURSE OBJECTIVES:

- To know different terms of power quality.
- To develop the knowledge about the effect of non-linear loads and disturbances on sensitive loads.
- To know the standards and classification of power quality disturbances.
- To study the causes, effects and mitigation of voltage sag, interruption and over voltages.
- To develop the brief concepts of harmonic and mitigation techniques.
- To study the power quality monitoring method, equipment and develop the ability to analyze the measured data.

COURSE OUTCOMES:

After completing this course students will able to:

EE42252(T).1: Define various power quality terms and standards.

EE42252(T).2: Identify different types of disturbances and illustrate mitigation methods and tools.

EE42252(T).3: Demonstrate different types and causes of transients and its behaviour.

EE42252(T).4: Assess the severity and solution to harmonics, a power quality problems in distribution system.

EE42252(T).5: Monitoring the power quality and apply the power quality conditioners to suppress power system disturbances using custom power devices.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR (4 YDC) SEM A
EE42498: MAJOR PROJECT PHASE I

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
-	8	-	-	4	-	-	-	40	60	100

COURSE OUTCOMES:

After completing the Major Project Phase I, the student will able to:

EE42498 (P).1: Identify problem of a selected area in engineering domain.

EE42498 (P).2: Explore the state of art of the selected problem.

EE42498 (P).3: Formulate the problem and suggest expected outcomes of the solutionusing software/hardware.

EE42498 (P).4: Integrate the information from multiple sources and demonstrate anapplication of appropriate societal and professional ethical standards.

EE42498 (P).5: summarize the findings in terms of technical report.

CRITERIA AND RUBRICS

INTERNAL ASSESSMENT

Maximum Marks: 40 Marks
Student will be judged using following criteria and rubrics:

S. No	Criteria	Marks	CO
1	Selection of Problem	5	CO1
2	Literature survey	10	CO2
3	Proposed Design	10	CO1,CO3,CO4
4	Impact on Society	5	CO4
5	Report	10	CO5

EXTERNAL ASSESSMENT:

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S. No.	Criteria	Marks	CO
1	Presentation	10	CO1, CO2,CO3
2	Organization of Thesis	20	CO5
3	Learning Outcome	10	CO3
4	Ethical Practise	5	CO4
5	Results	10	CO1,CO2, CO3
6	Confidence	5	CO1, CO4

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR SEM A (4 YDC)

EE42481: EVALUTION OF INTERNSHIP-II

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
-	-	-	-	2	-	-	-	40	60	100

COURSE OUTCOMES:

After completing the Industrial Internship and seminar, student will able to:

EE42481(P).1: Select the industry and construct the company profile in terms of structure, product, services offered with brief history and key achievement.

EE42481(P).2: Asses their strength, weakness, and opportunity in the selected industry.

EE42481(P).3: Apply theoretical knowledge in practical situation by completing the task ingiven time period.

EE42481(P).4: Apply time management skill to complete the task and prepare draft report ofthe findings.

EE42481(P).5: Analyze the functioning of industry and suggest the changes for improvementof their services.

CRITERIA AND RUBRICS

INTERNAL ASSESSMENT

Maximum Marks: 40 Marks

Student will be judged using following criteria and rubrics:

S.No.	Criteria	Marks	CO
1	Learning Outcome	10	CO1, CO3, CO4
2	Time line	5	CO4
3	Leadership Developed	10	CO2, CO4
4	Organisation of Report	15	CO4, CO5

EXTERNAL ASSESSMENT

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S.No	Criteria	Marks	CO
1	Future Goals	5	CO5
2	Presentation	10	CO3
3	Technical Knowledge	20	CO1, CO2
4	Organisation of Report	20	CO3
5.	Confidence	5	CO4, CO5

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	3	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	2	3	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	3	2
CO5	-	-	-	-	-	1	-	-	3	3	3	-
Average	2.5	3	3	3	3	1	-	2	3	3	3	2

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR (4 YDC) SEM B
ELECTIVE-IV

EE 42602: ELECTRIC AND HYBRID VEHICLES

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	100
3	-	-	3	-	-	30	70	-	-	

PRE-REQUISITE: Basic knowledge of motors, energy storage and power electronics,simple mechanical systems, differential equations and control theory.

COURSE OBJECTIVES:

Objective of the course is to enhance the learning domain of the students such that they areable to,

1. Differentiate between the functioning of IC engine based vehicles and electric vehicles.
2. Identify the types of motors and drive trains used in electric cars.
3. Discuss the application of power electric converters used in electric vehicles and the operation of DC/DC converters.
4. Describe the principles of battery operation& Estimate the battery performance.
5. Develop the basic understanding of charging methods of EVs covering: AC charging, DC charging, smart charging, vehicle to-grid technology, ICT for charging.

COURSE OUTCOMES:

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

EE42602(T).1: Differentiate the constructional features of electric vehicles and hybrid electric vehicles. Describe their working & Select the different drive trains and motors based on the application.

EE 42602(T).2: Recognize the various charging schemes for EV's,& elucidate the need ofbattery management system inelectric vehicles.

EE 42602(T).3: Explain the wireless and on-road charging of EV's, and classify thedifferent communication protocols in electric vehicles.

EE 42602(T).4: Interpret the mathematical model of an electric vehicle and analyze the performance of vehicle on different road conditions.

EE 42602(T).5: Categorize the different control strategies and algorithms for an electric vehicle.

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR (4 YDC) SEM B
EE 42660 : HVDC & FACTS

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	-	-	100

PRE- REQUISITE: Basic knowledge of Power system-I, Power system-II & Power Electronics is required

COURSE OBJECTIVES:

Students will be able to

1. Explain the importance of HVDC transmission, also analyse HVDC converters and their control characteristics.
2. Design filters to reduce harmonics in HVDC transmission systems.
3. Explain HVDC light systems and also compare them with classical systems.
4. Model HVDC system for AC-DC power flow.
5. Explain the importance of FACTs controllers, their different types and devices used.
6. Explain the objectives of shunt compensation and the FACTs controller used for shunt compensation.
7. Explain the objectives of series compensation and the FACTs controller used for series compensation.

COURSE OUTCOMES:

At the end of the course, students will develop ability to:

EE42660(T).1: Develop the knowledge of HVDC transmission, HVDC light system, HVDC converters and the applicability and advantages of HVDC transmission over conventional AC transmission.

EE42660(T).2: Formulate and **solve** mathematical problems related to rectifier and inverter control methods and learn about different control schemes as well as starting and stopping of DC links. Also able to model HVDC systems for AC-DC power flow.

EE42660(T).3: Anal**yze** the different harmonics generated by the converters and their variation with the change in firing angles. **Develop** harmonic models and use the knowledgeof circuit theory to develop filters.

EE42660(T).4: Develop the understanding of FACTs controller, types of FACTs controller.

EE42660(T).5: Analyze and select various FACTs devices and apply them for solving the problems of the AC transmission system.

EE42660(T).6: Develop mathematical and circuit models of the FACTs devices and use them for series compensation, shunt compensation, controlling the line power flow and enhancing transmission capacity.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-
CO3	3	-	3	-	-	-	-	-	-	-	-	-
CO4	-	3	3	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	-	-	-	-	-	-	-
CO6	3	3	3	2	-	-	-	-	-	-	-	-
Average	**3**	**3**	**3**	**2**	-	-	-	-	-	-	-	-

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR SEM B (4 YDC)
ELECTIVE-V
EE42703: SMART GRID: STRUCTURE, MONITORING AND CONTROL

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	-	-	100

PRE- REQUISITE: Power System I & II

COURSE OBJECTIVES:

1. To impart the knowledge of smart grid, need for smart grid domain, enablers, priority areas and regulatory challenges, smart-grid activities in India.
2. To explain the basic fundamentals components of Smart Grid designs, Transmission Automation, Distribution Automation.
3. To accomplish the different tools and computational techniques for smart grid.
4. To interpret students with the different communication technologies in Smart Grid.
5. To estimate the distribution generation technologies.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE42703.(T).1: Understand the function of smart grid is, what is the futuristic grid.
EE42703.(T).2: Assess the role of automation and digitization in Transmission and Distribution.
EE42703.(T).3: Addresses the issues related to implementation of smart grid approach through various techniques.
EE42703.(T).4: Analyze Smart grids and Distributed Energy Resources (DER) with evolutionary algorithms.
EE42703.(T).5: Distinguish potential impacts of emerging technologies on distribution network operation.
EE42703.(T).6: Determining the selected smart distribution and customer system projects.

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR SEM B (4 YDC)
ELECTIVE-V
EE42704: OPTIMIZATION TECHNIQUES APPLIED TO POWER SYSTEM

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	-	-	100

PRE- REQUISITE: Basic knowledge of Power System, Reliability Engineering and mathematics at XII level are required

COURSE OBJECTIVES:

1. To introduce the concept of maxima and minima of linear and nonlinear programming.
2. To learn the different classical and intelligent optimization methods to solve power system problems.
3. To understand the multi-objective optimization methods in power system problem solving.
4. To explain basics of magnetic circuit and its practical aspects.
5. To impart the knowledge of hybrid optimization of PSO, GAs and EA.
6. To teach students basic algorithms, flowchart, modelling and application of various optimization techniques.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE42704 (T).1: Apply knowledge of science, mathematics and power systems to explain optimization techniques, formulate various objective functions and constrained mathematical models using classical and intelligent approaches.

EE42704 (T).2: Utilize linear programming concepts in power system problems such as Simplex Method-I, analytical and graphical method. Describe integer programming with LPP.

EE42704 (T).3: Carry out non-linear programming calculations and analyse constrained and unconstrained problems of Maxima and Minima

including LagrangianMethod & Kuhn Tucker conditions.

EE42704 (T).4: Develop genetic Algorithm and traditional methods to Analyse Principles ofGenetic Algorithm, Evolutionary Strategy and Evolutionary Programming.

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EE42704 (T).5: Illustrate the algorithm of Particle Swarm Optimization and develop theability to hybrid optimization for particular applications.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	-	1	-	-	-	-	-	-	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	1	-	-	-	-	-	-	-	1
CO5	3	3	-	1	-	-	-	-	-	-	-	1
Average	**3**	**3**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR SEM B (4 YDC)
EE42XXX: HIGH PERFORMANCE COMPUTING

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	-	-	3	-	-	30	70	-	-	100

RE-REQUISITE: Basics of C programming, Basics of microprocessor,

COURSE OBJECTIVES:

1. Introduce the concept of high performance computing to the electrical engineers
2. Explain the concept of Parallelism in embedded CPU and GPUs
3. Explain programming model, optimization and performance analysis of embedded systems.
4. Demonstrate the communication mechanism among processors in the multiprocessor environment.

COURSE OUTCOMES (COs):

After completing the course, student will able to:

CO1: Apply high performance computing techniques to the electrical systems

CO2: Enhance the performance of compute intensive algorithms using embeddedCPU and GPUs architectures

CO3: Redefine the programming model to optimize the performance of embeddedsystems.

CO4: Design the communication mechanism among processors in the multiprocessorenvironment.

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR SEM B (4 YDC)
EE42999: MAJOR PROJECT PHASE II

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
-	8	-	-	4	-	-	-	40	60	100

COURSE OUTCOMES:

After completing the Major Project Phase II, the student will able to:

EE42999 (P).1: Communicate and work in team for developing leadership quality.

EE42999 (P).2: Execute proposed action plan , analysis and design.

EE42999 (P).3: Apply Software /hardware solution methodologies for the implementation of the proposed design.

EE42999 (P).4: Practise social and professional ethical standards.

EE42999 (P).5: Exercise quality writing skills for technical report and presentation.

CRITERIA AND RUBRICS

INTERNAL ASSESSMENT

Maximum Marks: 40 Marks
Student will be judged using following criteria and rubrics:

S. No	Criteria	Marks	CO
1	Selection of Problem	5	CO2
2	Proposed Design	10	CO3
3	Implementation of Design	10	CO1,CO2,CO3
4	Impact on Society	5	CO4
5	Report	10	CO5

EXTERNAL ASSESSMENT:

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S. No	Criteria	Marks	CO
1	Presentation	10	CO1, CO2
2	Organization of Thesis	20	CO5
3	Learning Outcome	10	CO3
4	Ethical Practise	5	CO4
5	Results	10	CO1,CO2, CO3
6	Confidence	5	CO1

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH. FOURTH YEAR (4 YDC) SEM B

EE42881: INDUSTRIAL TRAINING AND INTERNSHIP

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
-	-	-	-	4	-	-	-	40	60	100

COURSE OUTCOMES:

After completing the Industrial Internship and seminar, student will able to:

EE42881(P).1: Select industry/institute of interest for internship.
EE42881(P).2: Identify the technical problems and its causes and propose a suitable practical solution.
EE42881(P).3: Interact with industry professional/institute faculty for the facedchallenges and their solution adopted.
EE42881(P).4: Apply soft skills such as time management , positive attitude and communication skills.
EE42881(P).5: Summarize the findings in terms of technical report.
EE42881(P).6: Get exposure of real life industrial or other higher side institute environment.

CRITERIA AND RUBRICS:

INTERNAL ASSESSMENT:

Maximum Marks: 40 Marks
Student will be judged using following criteria and rubrics:

S. No.	Criteria	Marks	CO
1	Learning Outcome	10	CO1, CO2, CO6
2	Time line	5	CO4
3	Leadership Developed	10	CO3, CO4
4	Organization of Report	15	CO5, CO6

EXTERNAL ASSESSMENT

Maximum Marks: 60 Marks

Student will be judged using following criteria and rubrics:

S. No.	Criteria	Marks	CO
1	Future Goals	5	CO6
2	Presentation	10	CO3
3	Technical Knowledge	20	CO1, CO2
4	Organisation of Report	20	CO5
5.	Confidence	5	CO4

CO-PO MAPPING:

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

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH FOURTH YEAR SEM A (4 YDC)
EE 42675 ARTIFICIAL NEURAL NETWORK

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	
3	2		3	1		30	70	40	60	200

PRE- REQUISITE: Basic knowledge of Artificial Neural Network.

COURSE OBJECTIVES:
The objective of this course is to provide students with a sound and comprehensive understanding of artificial neural networks, including subjects of the McCulloch-Pitts Model, activation functions, feed-forward and feed-back network structures, approximation of nonlinear functions, supervised and unsupervised machine learning algorithms, logic networks, recurrent networks, finite state machines, weighted networks, pattern recognition, linear separability, perceptron learning algorithms, accelerating convergence.

COURSE OUTCOMES:

EE 42675(T).1: Define what is Neural Network and model a Neuron and Express both Artificial
Intelligence and Neural Network
EE 42675(T).2:. Analyse ANN learning, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning and Boltzmann learning
EE 42675(T).3:. Implement Simple perceptron, Perceptron learning algorithm, Modified Perceptron learning algorithm, and Adaptive linear combiner, Continuous perceptron, learning in
continuous perceptron
EE 42675(T).4:. Analyse the limitation of Single Layer Perceptron and Develop MLP with 2 hidden layers, Develop Delta learning rule of the output layer and Multilayer feed forward
neural network with continuous perceptions
EE 42675(T).5: Analyse Boltzmann machines, Cauchy training. Hopfield networks: Recurrent network configurations, Kohonen layer.

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										
CO2			2	2								
CO3		1	2									
CO4	2	1		2								
CO5	2		2	2								
Average	**2**	**1**	**2**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH FOURTH YEAR (4 YDC)
EE42706 : HIGH PERFORMANCE COMPUTING

HOURS PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	CW	END SEM	100
3	-	-	3	-	-	30	70	-	-	

COURSE OBJECTIVES:

1. Introduce the concept of high performance computing to the electrical engineers
2. Explain the concept of Parallelism in embedded CPU and GPUs.
3. Explain programming model, optimization and performance analysis of embedded systems.
4. Demonstrate the communication mechanism among processors in the multiprocessor environment.

COURSE OUTCOMES:

After completing the course, student will able to:

EE42706 (CO1): Apply high performance computing techniques to the electrical systems

EE42706 (CO2): Enhance the performance metrics of HPC programs. Multi-CPU computing using both distributed and shared memory architecture.

EE42706 (CO3): Describe OpenMP and MPI based parallelization of iterative matrix solvers.

EE42706 (CO4): Redefine Different parallel computing tools like MPI, OpenMP and CUDA with domain specific problems.

EE42706 (CO5): Graphics processing unit (GPU) architecture and concepts of CUDA. Matrix calculations using CUDA also demonstrated.

CO-PO MAPPING:

CO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1				3						3		
CO2		3			3					3		
CO3	3	3		3	3	3				3		3
CO4	3	3								3		
CO5		3		3						3		
Average	3	3	0	3	3	3	0	0	0	3	0	3

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH FOURTH YEAR (4 YDC)
EE42004: RELIABILITY ENGINEERING

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	100
4			4			30	70			

PRE- REQUISITE: Basic knowledge of Network Theory , Control system and Mathematics

COURSE OBJECTIVES:

1. Encourage understanding and appreciation of learning probability and reliability theory.
2. Evolve the efficacy to develop reliability models of electrical systems.
3. Learn Modern simulation tools aiding in reliability analysis.
4. Explain the possible causes of poor reliability and suggest appropriate reliability tests and the associated failure analysis methods.
5. Apply reliability theory to assessment of reliability in engineering design.

COURSE OUTCOMES:

After completing this course, the student will be able to

EE42004(T).1: Demonstrate an understanding of the concepts of reliability engineering and various failure distributions.

EE42004(T).2: Identify importance of statistical distributions for modelling failure data and the physical meanings of different parameters.

EE42004(T).3: Evolve the efficacy to develop reliability models of complicated systems and be able to analyze and interpret the data to infer reliability indices from the data.

EE42004(T).4: Estimate model mean time to failure and demonstrate an understanding of steady state and time-dependent probabilities.

EE42004(T).5: Estimate reliability and parameters for failure laws from the test data.

CO-PO MAPPING:

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	2										
CO3			3	1								
CO4	3	2	3									
CO5	3		3									
Average	3	2	3	1	0	0	0	0	0	0	0	0

ELECTRICAL ENGINEERING DEPARTMENT
B.TECH FORTH YEAR (4 YDC)
EE 42701: ENERGY AND ENVIRONMENT AUDIT AND MODELLING

PERIOD PER WEEK			CREDITS			MAXIMUM MARKS				
						THEORY		PRACTICAL		TOTAL MARKS
T	P	TU	T	P	TU	CW	END SEM	SW	END SEM	100
4	-	-	4	-	-	30	70	40	60	

PRE- REQUISITE: Basic knowledge of Electrical Management**.**

COURSE OBJECTIVES:

1. Understanding basics of demand side management and mechanisms (technical, legal or financial) that influences energy consumption.
2. Recognizing opportunities for increasing rational use of energy.
3. Learning the basics of energy auditing with application on different sectors.

COURSE OUTCOMES:

EE42701(T).1: Carry out energy audit of an industry/Organization.

EE42701(T).2: Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream

EE42701(T).3: Select appropriate energy conservation method to reduce the wastage of energy

EE42701(T).4: Knows the relevant national and international standards in these fields.

CO -PO mapping

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3	3			3						
CO2		3	3	2		3	3					
CO3	1	3	3			3	3					
CO4		3				3	3					
average	1	3	3	2		3	3	0	0	0	0	0