DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common for all branches)	
Course Outcomes: At the end of this course students will demonstrate the ability to	
CO1	Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.
CO2	Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.
CO3	Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

CO-PO Mapping

Cos	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3										2	3
CO2	3	3	3										2	3
CO3	3	3	3	2									3	3

1 - Low, 2 - Medium, 3 - High

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common for all branches)	
Course Outcomes: At the end of this course students will demonstrate the ability to	
CO1	Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.
CO2	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.
CO3	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.

CO-PO Mapping

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

1 - Low, 2 - Medium, 3 - High

ELECTRICAL CIRCUIT ANALYSIS - I	
Course Objectives: To develop an understanding of the fundamental laws, elements of electrical circuits and to apply circuit analysis to DC and AC circuits.	
Course Outcomes: At the end of this course students will demonstrate the ability to	
CO1	Remembering the basic electrical elements and different fundamental laws.
CO2	Understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance, phasor diagrams, resonance and network theorems.
CO3	Apply the concepts to obtain various mathematical and graphical representations.
CO4	Analyse nodal and mesh networks, series and parallel circuits, steady state response,different circuit topologies (with R, L and C components).
CO5	Evaluation of Network theorems, electrical, magnetic and single-phase circuits.

CO-PO Mapping

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

1 - Low, 2 - Medium, 3 - High

ELECTRICAL CIRCUIT AANALYSIS – I LABORATORY

Course Objectives:

To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usageof different circuits with different conditions.

Course Outcomes: At the end of this course students will demonstrate the ability to

CO1	Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams.
CO2	Apply various theorems to compare practical results obtained with theoreticalcalculations.
CO3	Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil.
CO4	Analyze different circuit characteristics with the help of fundamental laws and various configurations.
CO5	Create locus diagrams of RL, RC series circuits and examine series and parallelresonance.

CO-PO Mapping

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

1 - Low, 2 - Medium, 3 - High

NETWORK ANALYSIS	
Course Outcomes: At the end of this course students will demonstrate the ability to	
CO1	Understand basic electrical circuits with nodal and mesh analysis.
CO2	Analyse the circuit using network simplification theorems.
CO3	Find Transient response and Steady state response of a network.
CO4	Analyse electrical networks in the Laplace domain.
CO5	Compute the parameters of a two-port network.

CO-PO Mapping

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

1 - Low, 2 - Medium, 3 - High

NETWORK ANALYSIS LABORATORY	
Course Outcomes:	
CO1	Verify Kirchoff's laws and network theorems.
CO2	Measure time constants of RL & RC circuits.
CO3	Analyze behavior of RLC circuit for different cases.
CO4	Design resonant circuit for given specifications.
CO5	Characterize and model the network in terms of all network parameters.

CO-PO Mapping

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

1 - Low, 2 - Medium, 3 - High

ELECTROMAGNETIC FIELD THEORY	
Course Objectives: 1. To review the fundamentals of the different coordinate systems, vector algebra and calculus 2. To teach the basic laws of electromagnetism 3. To learn to compute and visualize the electrostatic and magnetostatic fields for simple configurations 4. To analyse the time varying electric and magnetic fields and to understand Maxwell's equations 5. To understand the propagation of electromagnetic waves through different media	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Remember the concepts of vector algebra, vector calculus, various fundamental laws, self and mutual inductance. (BL1)
CO 2	Understand the concepts of electrostatics, conductors, dielectrics, capacitance, magneto statics, magnetic fields, time varying fields, self and mutual inductances. (BL2)
CO 3	Apply vector calculus, Coulomb's law, Gauss's law, Ohm's law in point form, Biot- Savart's law, Ampere's circuital law, Maxwell's third equation, self and mutual inductances, Faraday's laws, Maxwell's fourth equation, Poynting theorem to solve various numerical problems. (BL3)
CO 4	Analyze vector calculus, electrostatic fields, behavior of conductor in electric filed, Biot-Savart's law and its applications. (BL4)
CO 5	Analyze magnetic force, moving charges in a magnetic field, self-inductance of different cables, mutual inductance between different wires and time varying fields. (BL4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2									2	1
CO2	3	3	2	2									2	1
CO3	3	3	1	1									2	1
CO4	3	3	2	2									2	1
CO5	3	3	2	2									2	1
1: Low, 2-Medium, 3- High														

Electrical Circuit Analysis – II	
Course Objectives: 1. To know the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits. 2. Knowing how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations. 3. To introduce the various two-port networks parameters for a given circuit. 4. To evaluation of poles and zeros of a given transfer function. 5. To study the different types of filters	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Remember the concepts of Laplace transforms, formulation of various circuit topologies (R, L and C components) and basic filters. (BL1)
CO 2	Understand three phase balanced and unbalanced circuits, different circuit configurations and it's mathematical modeling, network parameters and various filters. (BL2)
CO 3	Apply Laplace transforms to solve various electrical network topologies and filter design concepts. (BL3)
CO 4	Analyze three phase circuits, transient response of various network topologies, electric circuits with periodic excitations and filter characteristics. (BL4)
CO 5	Design suitable electrical circuits and various filters for different applications. (BL5)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	3	2									3	3
CO2	3	3	3	2									3	3
CO3	3	3	3	2									3	2
CO4	3	3	3	2									1	2
CO5	2	2	3	2									2	1
1: Low, 2-Medium, 3- High														

DC MACHINES AND TRANSFORMERS

Course Objectives:

1. To understand the constructional features of DC machines.
2. To understand the phenomena of armature reaction and commutation.
3. To understand the characteristics and parallel operation of dc machines.
4. To understand the methods for speed control of DC motors and applications of DC motors.
5. To understand the various types of losses that occurs in DC machines and how to calculate efficiency.
6. To understand the constructional features of a single phase transformer.
7. To understand the efficiency and voltage regulation of a transformer.
8. To understand the Autotransformers Construction & Comparison with two winding transformer.
9. To suggest a suitable three phase transformer connection for a particular operation.
10. To understand the tap changing of transformers.

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

CO 1	Understand the process of voltage build-up in DC generators and characteristics. (BL2)
CO 2	Understand the process of torque production, starting and speed control of DC motors and illustrate their characteristics. (BL2)
CO 3	Obtain the equivalent circuit of single-phase transformer, auto transformer and determine its efficiency & regulation. (BL3)
CO 4	Apply various testing methods for transformers and speed control of DC motors. (BL3)
CO 5	Analyze various configurations of three-phase transformers. (BL4)

CO-PO Mapping

CO	PO												PSO	
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	2	2	2	2		2				1	1	2	2	1
CO2	2	2	2	2		2				1	1	2	1	2
CO3	2	2	2	2		2				1	1	2	2	1
CO4	2	3	3	2		2				1	1	2	2	1
CO5	3	3	3	3		2				1	1	2	1	2

1: Low, 2-Medium, 3- High

ELECTRICAL CIRCUIT ANALYSIS - II AND SIMULATION LAB	
Course Objectives: The objectives are to study: 1. To design electrical systems. 2. To analyze a given network by applying various Network Theorems. 3. To measure three phase Active and Reactive power. 4. To understand the locus diagrams	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the power calculations in three phase circuits. (BL2)
CO 2	Analyze the time response of given network. (BL4)
CO 3	Determination of two port network parameters. (BL4)
CO 4	Simulate and analyze electrical circuits using software tools. (BL4)
CO 5	Apply various theorems to solve different electrical networks using simulation tools. (BL3)

CO-PO & PSO Mapping:

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

1 – Low Level; 2 – Moderate Level; 3 – High Level

DC MACHINES AND TRANSFORMERS LAB	
Course Objectives: 1. To familiarize students about OCC and internal, external characteristics of dc shunt generator. 2. To know the performance characteristics and speed control method of dc shunt motor 3. To know how to predetermine the efficiency of dc shunt motor. 4. To find efficiency, losses and regulation of single phase transformer. 5. To know how to find motor and generator efficiency by connecting to dc shunt machines back to back 6. To familiarize students about characteristics of dc series motor	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Demonstrate starting and speed control methods of DC Machines. L2
CO 2	Apply theoretical concepts to determine the performance characteristics of DC Machines. L3
CO 3	Analyze the parallel operation of single phase transformers. L4
CO 4	Determine the performance parameters of single-phase transformer. L3
CO 5	Analyze the performance analysis of transformers using various tests. L4

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO1	3	3	3	2	2				3	2		3	3	3
CO2	2	3	3	1	2				2	2		3	3	3
CO3	3	3	3	1	2				2	2		3	3	3
CO4	3	3	3	1	2				2	2		3	3	3
CO5	3	3	3	1	2				2	2		3	3	3
1: Low, 2-Medium, 3- High														

POWER SYSTEM – I	
Course Objectives: 1. To understand the structure, essential components and their layout in non renewable generating stations. 2. To understand the electrical power generation from renewable energy sources as Nuclear Energy 3. To understand the different types of substations and their working./operation. 4. To understand the various types of distribution system. 5. To understand the calculation of economic aspects and different types of tariff.	
Course Outcomes: On successful completion of the course, student will be able to:	
CO 1	Understand the different types of power plants, operation of power plants. (BL2)
CO 2	Understand the concepts of distribution systems, underground cables, economic aspects and tariff (BL2)
CO 3	Understand various substations that are located in distribution systems (BL2)
CO 4	Apply the above concepts to illustrate different power generation layouts (BL3)
CO 5	Analyze various economic aspects related to power generation and distribution (BL4)

CO-PO Mapping

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

1: Low, 2-Medium, 3- High

INDUCTION AND SYNCHRONOUS MACHINES	
Course Objectives: 1. To understand the Constructional details, principle of operation and the importance of slip in Induction motor operation 2. To understand the slip-torque characteristics and torque calculations of Induction motor 3. To understand the methods of starting and speed control of Induction motor 4. To understand the construction and principle of working of synchronous machines 5. To understand the different methods of predetermining the regulation of alternators 6. To understand the concepts and computation of load sharing among alternators in parallel. 7. To understand the performance characteristics of synchronous motors and their use as synchronous condensers for power factor improvement. 8. To understand the different types of single phase motors and special motors used in house hold appliances and control systems.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the construction, principle and operation of single phase and three phase induction motors (BL-2)
CO 2	Understand the construction, principle and operation of synchronous generator and Synchronous motor (BL-2)
CO 3	Understand various applications of various alternating machines (BL-2)
CO 4	Apply the above concepts to solve various mathematical and complex problems (BL-3)
CO 5	Analyze the characteristics of induction motor, synchronous motor and synchronous generators (BL-4)

CO-PO Mapping														
CO	**PO**												**PSO**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO 2**
CO1	3	2	1										2	2
CO2	3	2	2										2	2
CO3	3	2	2										2	2
CO4	3	2	1										2	2
CO5	3	2	1										2	2
1: Low, 2-Medium, 3- High														

CONTROL SYSTEMS	
Course Objectives: 1. To understand the merits and demerits of open and closed loop control systems 2. To understand the mathematical modeling of Electrical and mechanical control systems 3. To understand the step response of second order control systems 4. To plot Root locus for the given system transfer function 5. To understand the stability analysis from Bode plot, polar plots 6. To understand the state space analysis	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Understand the concepts of various mathematical representations of control systems, Time response of first order and second order systems, stability, frequency response and fundamentals of modern control systems (BL-2)
CO 2	Apply Block diagram reduction, Signal flow graph, Routh criterion, Root locus, Bode, Polar, Nyquist concepts for solving various numerical problems (BL-3)
CO 3	Analyze time response characteristics, frequency response characteristics, stability analysis of various control systems (BL-4)
CO 4	Design various compensators and controllers for different control systems by using design procedures (BL-5)
CO 5	Create suitable control systems for various real time applications (BL-5)

CO-PO Mapping

CO	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
CO1	3	2												1
CO2	2	1												1
CO3	2	1												1
CO4	2	1	1											1
CO5	2	1	1											1
1: Low, 2-Medium, 3- High														

INDUCTION AND SYNCHRONOUS MACHINES LAB	
Course Objectives: 1. To find the performance of induction motor by calculating the efficiency. 2. To find direct and quadrature axis reactances of synchronous motor. 3.To find voltage regulation by using various methods on synchronous machine4.To determine 'v' and 'inverted v' curves of synchronous motor. 5. To find the efficiency and power factor from circle diagram byconducting no load andblocked rotor test on 3-phase induction motor.	
Course Outcomes: After successful completion of the course, the student will be able to:	
CO 1	Analyze various performance characteristics of 3-phase and 1-phase induction Motors (BL-4)
CO 2	Evaluate the performance of 3-phase Induction Motor by obtaining the circle diagram and equivalent circuit of 3-phase Induction Motor and single phase induction motor (BL-4)
CO 3	Adapt the power factor improvement methods for single phase Induction Motor (BL-3)
CO 4	Pre-determine the regulation of 3-phase alternator (BL-3)
CO 5	Determine the synchronous machine reactance of 3-phase alternator (BL-3)

CONTROL SYSTEMS LAB

Course Objectives:

The objectives are to study:

1.To provide practical knowledge for Time response of second order system

2. Determine of transfer functions of various systems and control of it by different Methodologies

3. The characteristics of Magnetic Amplifier, servo mechanisms which are helpful in automatic control systems

4. Determine the stability analysis of different system by using PSPICE and MATLAB

5. To study the closed loop performance for the given plant using P, PD, PI, PID Controllers.

6. The design of controllers/compensators to achieve desired specifications.

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

CO 1	Understand how to use feedback control system to determine transfer function of DC servo motor and any other given circuit with R, L and C components (BL-2)
CO 2	Model the systems and able to design the controllers and compensators. (BL-3)
CO 3	Get the knowledge about the effect of poles and zeros location on transient and steady state behavior of second order systems and implement through software tools (BL-4)
CO 4	Determine the performance and time domain specifications of first and second order systems. (BL-4)
CO 5	Understand the stability analysis (BL-2)

CO-PO Mapping

CO	PO												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
CO1	3	2			3				2	2		3	3	3
CO2	2	3	3	3	3				3	2		3	3	3
CO3	2	2	3	2	3				2	2		3	3	2
CO4	2	2	3	2	3				2	2		3	3	2
CO5	2	2	3	2	3				2	2		3	3	2

1: Low, 2-Medium, 3- High