SCHEME OF COURSE WORK

Course Title	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING		
Course Code	**22EE11D4**	L T P C	3 0 0 3
Program	B.Tech		
Branch	Computer Science and Engineering		
Semester	II		
Prerequisites	Mathematics and Physics		
Course to which it is prerequisite	All advanced courses in electrical &electronics.		

Course Outcomes (COs):

CO 1: Analyze the behavior of an electrical circuit.
CO 2: Measure the performance quantities such as losses, efficiency of DC machines
CO 3: Measure the performance quantities such as losses, efficiency of AC machines
CO 4: Understand the importance and application of p-n junction diode
CO 5: Evaluate the configurations and applications of Op-Amps.

Program Outcomes (POs):

A graduate of Computer Science and Engineering will be able to

PO-1	Graduates will be able to apply the knowledge of mathematics, science, engineering fundamentals and principles of Computer Science & Engineering to solve complex problems in different domains
PO-2	Graduates can identify, formulate, study contemporary domain literature and analyse real life problems and make effective conclusions using the basic principles of science and engineering
PO-3	Graduates will be in a position to design solutions for Engineering problems requiring in depth knowledge of Computer Science and design system components and processes as per standards with emphasis on privacy, security, public health and safety.
PO-4	Graduates will be able to conduct experiments, perform analysis and interpret data as per the prevailing research methods and to provide valid conclusions.
PO-5	Graduates will be able to select and apply appropriate techniques and use modern software design and development tools. They will be able to predict and model complex engineering activities with the awareness of the practical limitations.
PO-6	Graduates will be able to carry out their professional practice in Computer Science & Engineering by appropriately considering and weighing the issues related to society and culture and the consequent responsibilities.
PO-7	Graduates would understand the impact of the professional engineering solutions on environmental safety and legal issues
PO-8	Graduates will transform into responsible citizens by adhering to professional ethics.
PO-9	Graduates will be able to function effectively in a large team of multidisciplinary streams consisting of persons of diverse cultures without forgetting the significance of each individual's contribution.
PO-10	Graduates will be able to communicate effectively about complex engineering activities with the engineering community as well as the general society, and will be

	able to prepare reports.
PO-11	Graduates will be able to demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.
PO-12	Graduates will engage themselves in self and life-long learning in the context of rapid technological changes happening in Computer Science and other domains.

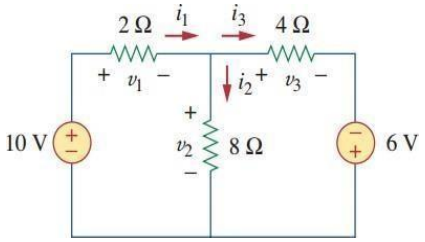
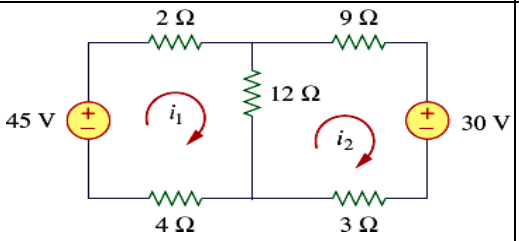
Course Outcome versusProgram Outcomes:

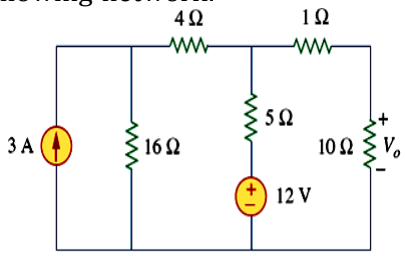
CO \ PO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	3	3		3	3				2	2		
CO-2	3	3		3	3				2	2		
CO-3	3	3		3	3				2	2		
CO-4	3	3		3	3				2	2		
CO-5	3	3		3	3				2	2		

S - Strongly correlated, M - Moderately correlated, Blank - No correlation

Assessment Methods	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	Teaching-learning strategy	Assessment Method & Schedule
1.	**BASIC LAWS AND THEOREMS** Ohm's law, Kirchoff's Laws, series and parallel circuits, source transformations, delta-wye conversion.	CO-1	a) Define Voltage, Current, Power, Energy and State Ohms Law and Kirchoffs Law. b) Write the V-I Characteristics of R-L-C. c) Find the Currents in the following circuit: 	▪ Lecture ▪ Problem solving	Assignment (Week 2) Mid-Test 1 (Week 9) Quiz (Week 4)
2.	Mesh analysis, nodal analysis, Linearity and superposition theorem	CO-1		▪ Lecture ▪ Problem solving	Mid-Test 1 (Week 9) Quiz (Week 4)

			a) Calculate the Mesh Currents in the circuit shown in the Fig. b) Write the statement of Superposition Theorem and Explain in detail. c) Explain the principle of Linearity.		
3.	Thevenin's theorem, Norton's theorem, maximum power transfer theorem with basic problems.	CO-1	a) Apply Thevenin's Theorem for the following network:  b) Explain Maximum Power Transfer Theorem and derive the condition for obtaining Maximum power to the circuit.	▪ Lecture ▪ Problem solving	Assignment (Week 2)
4.	**DC MACHINES**: Constructional features induced EMF and torque expressions with simple problems	CO-2	a) Explain the principle of operation of a DC motor. b) Derive the EMF and Torque equation of a DC Machine. c) A short-shunt compound d.c generator delivers 100 A to a load at 250 V. The generatorhasshunt field, series field and armature resistance of 130 Ω, 0.1 Ω and 0.1 Ω respectively.Calculate the voltage generated in armature winding. Assume 1V drop per brush	▪ Lecture ▪ Problem solving	Mid-Test 1 (Week 9) Quiz (Week 4)
5.	Different types of excitation, performance characteristics of different types of dc machines,	CO-2	a) Explain about DC Shunt Motor performance characteristics. b) Draw the Internal and External Characteristics of DC Shunt Generator and explain.	▪ Lecture ▪ Problem solving	Mid-Test 1 (Week 9) Quiz (Week 4)
6.	3-point starter, losses and efficiency, efficiency by direct loading with basic problems	CO-2	a) What are the various losses that can be determined in a DC Machines? b) Draw and Explain about 3-Point Starter in detail. c) Explain Brake test on DC Shunt Motor with neat sketch.	▪ Lecture ▪ Problem solving	Mid-Test 1 (Week 9)
7.	**AC MACHINES** Transformers: Constructional details, EMF equation, voltage regulation	CO-3	a) Describe the operation of a 1-Φ transformer, explaining clearly the functions of thedifferent parts. Why are the cores laminated? b) Derive the EMF equation of a 1-Φ transformer.	▪ Lecture ▪ Problem solving	Assignment (Week 2)

			c) Define voltage regulation of a transformer and derive the conditions for i) Zero regulationii) Maximum regulation		
8.	losses and efficiency, open/short- circuit tests and determination of efficiency with basic problems.	CO-3	a) Explain about OC and SC Test for a 1-Φ transformer. b) A 230/110 V single-phase transformer takes an input of 350 V A at no load and at rated voltage. The core loss is 110 W. Find i) the iron-loss component of no-load current,ii) the magnetizing component of no-load current and iii) no-load power factor.	▪ Lecture ▪ Problem solving	Mid-Test 1 (Week 9) Quiz (Week 4)
9.	**MID TEST - 1**				
10.	Three Phase Induction Motors: Construction, working principle, Torque and Torque-Slip characteristics, efficiency with basic problems.	CO-3	a. Compare and contrast between squirrel-cage and slip-ring motors with respect to construction, operation, and performance of the machines. b. Explain the concept of RMF and SLIP. c. The frequency of emf in the stator of a 4-pole induction motor is 50 Hz, and that in the rotoris 1.5 Hz. Compute (i) slip (ii) rotor speed	▪ Lecture ▪ Problem solving	Quiz (Week 13) Mid-Test 2 (Week 18)
11.	Synchronous Motor: Construction, EMF Equation, working principle.	CO-3	a. Explain the Construction of Synchronous Motor. b. Derive the EMF equation of a Synchronous Motor. c. Is Synchronous Motor Self-starting or not? Explain.	▪ Lecture ▪ Problem solving	Assignment (Week 12) Mid-Test 2 (Week 18)
12.	**SEMICONDUCTOR DEVICES** P-N Junction diode - Basic operating principle, current-voltage characteristics, rectifier circuits (half-wave, full-wave, rectifier with filter capacitor),	CO-4	a. Explain the basic operating principle of a PN Junction Diode with neat sketches. b. Draw the V-I Characteristics of a PN Diode. c. Explain the operation of Bridge Rectifier with and without Capacitive filter.	▪ Lecture ▪ Problem solving	Quiz (Week 13) Mid-Test 2 (Week 18)
13.	Zener diode as Voltage Regulator; Metal oxide semiconductor field effect transistors	CO-4	a) Explain the concept of Zener diode as Voltage Regulator b) Explain the operation of MOSFET	▪ Lecture ▪ Problem solving	Assignment (Week 12) Mid-Test 2 (Week 18)

	(MOSFET): Operation of NMOS and PMOS		for i) NMOS ii) PMOS		
14.	FETs, MOSFET as an amplifier and switch	CO-4	a. Explain how FET is used as an Amplifier. b. How MOSFET is used as both Amplifier and Switch.	▪ Lecture ▪ Problem solving	Mid-Test 2 (Week 18)
15.	OPERATIONAL AMPLIFIERS: The Ideal Op Amp, The Inverting Configuration, The closed loop gain, Effect of Finite open-loop gain, The closed loop gain,	CO-5	a) Draw the block diagram of operational amplifier and explain it in detail. b) Describe the ideal characteristics of Op-amp. c) For the inverting amplifier given that R1=1kΩ and Rf=10kΩ. Assuming an ideal amplifier, calculate the output voltage for the input of 1V	▪ Lecture ▪ Problem solving	Mid-Test 2 (Week 18)
16.	The Non Inverting Configuration,Characteristics of Non Inverting Configuration, Effect of finite open loop gain	CO-5	a) For the non-inverting amplifier given that input voltage is 6V and R1=2kΩ and Rf=10kΩ. Calculate the output voltage. b) Draw the circuit symbol of op-amp. Explain what is mean by inverting input and non-inverting input?	▪ Lecture ▪ Problem solving	Mid-Test 2 (Week 18)
17.	The voltage follower,Difference amplifiers, A Single Op-amp difference amplifier.	CO-5	a) What is voltage follower? Explain it in detail. b) Draw the circuit diagram of differential amplifier and explain?	▪ Lecture ▪ Problem solving	Mid-Test 2 (Week 18)
18.	**MID TEST - 2**				
19.	**SEMESTER END EXAM**				