CBCS SCHEME

First/Second Semester B.E./B.Tech. Degree Examination, June/July 2024
Elements of Electrical Engineering

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	State and explain the Kirchoff's laws as applied to an electric circuit.	08	L2	CO1
	b.	Two resistances 50 Ω and 100 Ω are connected in parallel. A resistance of 20 Ω is connected in series with the combination. A voltage of 230 V is applied across the circuit. Determine the current in each resistor and voltage across 20 Ω resistor. Calculate also the power consumed in all resistors.	06	L3	CO1
	c.	State and explain Lenz's law.	06	L2	CO1
		OR			
Q.2	a.	State and explain Faraday's laws of electromagnetic induction.	08	L2	CO1
	b.	Derive an expression for dynamically induced EMF.	08	L3	CO1
	c.	Two 1000 turn air cored coils, 100 cm long, having a cross-sectional area of 500 cm^2 are placed side by side. The mutual inductance between them is 25 mH. Determine the self inductances of the coils and the co-efficient of coupling.	04	L3	CO1
		Module – 2			
Q.3	a.	Define Root Mean Square (RMS) value of an alternating current and derive the equation for RMS value in terms of maximum value.	08	L1	CO2
	b.	For the current wave i = 200 sin 314t. Determine i) RMS value ii) Average value iii) Frequency iv) Form factor v) Peak factor.	06	L2	CO2
	c.	Show that in a pure inductor, the current lags behind the voltage by 90°. Also draw the voltage and current waveforms.	06	L3	CO2
		OR			
Q.4	a.	Derive an equation for power consumed by an R-L series circuit. Draw the waveform of voltage, current and power.	08	L3	CO2
	b.	A circuit consists of a resistance of 20Ω an inductance of 0.05 H connected in series. A supply of 230V at 50 Hz is applied across the circuit. Determine the current, power factor and power consumed by the circuit.	06	L3	CO2
	c.	Explain i) Real Power ii) Reactive power iii) Power factor With respect to single phase A.C circuits.	06	L2	CO2
		Module – 3			
Q.5	a.	What are the advantages of three phase systems over single phase system? Explain.	06	L2	CO2
	b.	Deduce the relationship between the phase and line voltage, line current and power in a 3 phase star connected system.	08	L3	CO2
	c.	Three coils each having a resistance of 20Ω and an inductive reactance of 15Ω are connected in star to a 400V, 3 phase 50 Hz supply. Calculate i) Line current ii) Power factor iii) Power supplied.	06	L3	CO2

		OR			
Q.6	a.	Show that only two wattmeters are sufficient to measure power in a three phase balanced star connected system with the help of circuit diagram and phasor diagram.	08	L3	CO2
	b.	A balanced 3 phase star connected system draws power from 440 V supply. The two wattmeters connected indicate w_1 = 5 kW and w_2 = 1.2 kW. Calculate power, power factor and current in the circuit.	06	L3	CO2
	c.	Explain the following terms with respect to 3ϕ system: i) Phase sequence ii) Balanced supply iii) Balanced load	06	L3	CO2
Module – 4					
Q.7	a.	With neat circuit diagram, explain construction and working of Wheatstone Bridge and derive the conditions of balance.	08	L2	CO4
	b.	With neat circuit diagram and truth table, explain two way control of a Lamp load.	06	L2	CO5
	c.	Write a short note on Current transformer.	06	L2	CO4
		OR			
Q.8	a.	Explain important factor to be considered for choice of domestic wiring.	06	L2	CO5
	b.	With neat circuit diagram, explain working of Kelvin double bridge for measurement of low resistance.	08	L2	CO4
	c.	Write a short note on Megger for insulation testing.	06	L2	CO4
Module – 5					
Q.9	a.	Define tariff. Explain two part tariff for electricity billing.	06	L2	CO5
	b.	What is earthing? With neat diagram explain plate earthing.	08	L2	CO5
	c.	With neat diagram, explain the working of Residual Current Circuit Breaker (RCCB).	06	L2	CO5
		OR			
Q.10	a.	What is an electric shock? What are the precautions to be taken to prevent against shock.	06	L2	CO5
	b.	A consumer has a maximum demand of 100 kW at 60% load factor. If the tariff is Rs.200 per kW of maximum demand plus Rs.5 per kWh. Calculate the overall cost per kWh.	08	L3	CO5
	c.	Write a short note on Fuse as protective device.	06	L2	CO5

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