CBCS SCHEME

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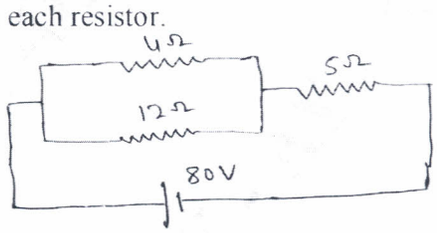
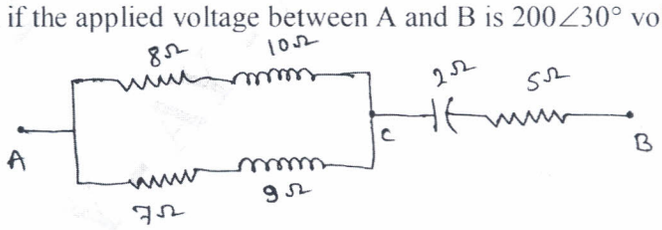
BEEE103/203

First/Second Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

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 Kirchoff's law as applied to D.C. circuits.	7	L1, L2	CO1
	b.	For a network shown in Fig.Q.1(b), determine: i) The voltage drop in each resistor ii) The current in each resistor.  Fig.Q.1(b)	6	L3	CO1, CO3
	c.	State and explain the Ohm's law. Mention its limitations.	7	L1, L2	CO1
		OR			
Q.2	a.	Explain statically and dynamically induced e.m.f.'s.	8	L1, L2	CO1
	b.	Two coupled coils of self-inductances 0.8H and 0.2 H have a co-efficient of coupling 0.9. Find the mutual inductance and turns ratio.	6	L3	CO1
	c.	Derive the energy stored in the magnetic field.	6	L1, L2	CO1
		Module – 2			
Q.3	a.	Define form factor, peak factor obtain its value for a sinusoidal voltage.	6	L1	CO2
	b.	Derive an expression for power in pure inductance circuit and draw voltage, current and power waveforms.	6	L1, L2	CO2, CO3
	c.	In the Fig.Q.3(b) shown below calculate the impedances of AB and the phase angle between voltage and current. Also calculate the total power consumed if the applied voltage between A and B is $200\angle 30°$ volts.  Fig.Q.3(b)	8	L3	CO2, CO3

		OR			
Q.4	**a.**	Derive the expression for R.M.S. value of current of a sinusoidally varying quantity.	**6**	**L1, L2**	**CO2**
	b.	Define power factor and mention its practical importance.	**7**	**L1, L2**	**CO2**
	c.	A series circuit with R = 10 Ω, L = 50 mH and C = 100 μF is supplied with 200 V, 50 Hz. Find: i) The impedance ii) Current iii) Power iv) Power factor.	**7**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Mention the advantages of three-phase system over single phase system.	**5**	**L2**	**CO2**
	b.	Obtain the relationship between line and phase, voltage and current in a three phase balanced star connected system.	**7**	**L1, L2**	**CO3, CO2**
	c.	A balanced 3-phase, star connected load of 150 kW takes a leading current of 100 A with line voltage of 1100 V, 50 Hz. Find the circuit constants of a load per phase.	**8**	**L3**	**CO2, CO3**
		OR			
Q.6	**a.**	Show that the two Wattmeter's are sufficient to measure three phase power. Hence derive the expression for the power factor in terms of Wattmeter readings.	**8**	**L1, L2**	**CO2**
	b.	Establish the relationship between the line and phase currents and voltages in a three phase balanced delta connected system.	**6**	**L1, L2**	**CO2, CO3**
	c.	A balanced delta-connected load of (8 + j6) Ω per phase is supplied from a 3-phase 440 V source. Find line current, power factor, power per phase and total power.	**6**	**L3**	**CO2, CO3**
		Module – 4			
Q.7	**a.**	Explain the construction and working of Kelvin's double bridge.	**8**	**L1, L2**	**CO4**
	b.	Explain two way and three way control of lamp with truth table.	**6**	**L1, L2**	**CO5**
	c.	Explain the construction and working of megger.	**6**	**L1, L2**	**CO5**
		OR			
Q.8	**a.**	Mention the difference between the current transformer and potential transformer.	**6**	**L1, L2**	**CO4**
	b.	Explain the construction of Schering's bridge and derive the expression for the unknown capacitance.	**8**	**L1, L2**	**CO4**
	c.	Write a short note on casing and capping wiring.	**6**	**L1, L2**	**CO5**
		Module – 5			
Q.9	**a.**	What is electric shock? Give the list of preventive measures against the shock.	**6**	**L1, L2**	**CO5**

	b.	Define tariff. Explain briefly the two part tariff with its advantage and disadvantage.	**6**	**L1, L2**	**CO5**
	c.	What is earthing? With neat diagram, explain pipe earthing.	**8**	**L1, L2**	**CO5**
		OR			
Q.10	**a.**	With neat diagram, explain the working of RCCB and ELCB.	**8**	**L1, L2**	**CO5**
	b.	Write a short note on fuse.	**5**	**L1, L2**	**CO5**
	c.	In a residential house the following loads are connected : i) Six lamps of 40 W each, switched on for 5 hr a day. ii) Two fans of 60 W each, switched on for 12 hr a day. iii) One 1000 W (1 kW) heater working for 2 hr per day. iv) One refrigerator of 250 W working for 10 hr per day. If each unit of energy costs Rs.1.90 what will be the total cost in the month of September.	**7**	**L3**	**CO5**

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