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CAMBRIDGE INSTITUTE OF TECHNOLOGY

K.R. PURAM, BENGALURU-560036.

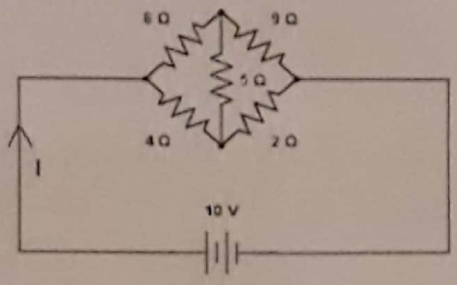
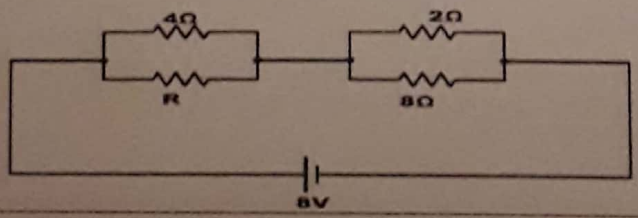
Department of Basic Sciences

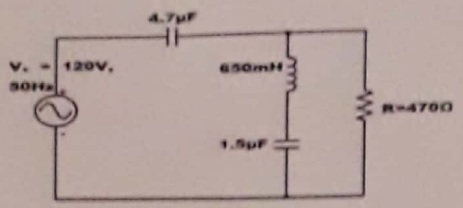
Preparatory Examination - Odd Semester 2018-19

Sub. Name: Basic Electrical Engineering **Sub. Code**: 18ELE13 **Semester**: I

Date: 11-01-2019 **Time**: 9:00 AM **Duration**: 3 Hours **Max. Marks**: 100

NOTE:
Answer five full questions, choosing one from each module, each full question carries maximum of 20 Marks.

Sl. No.	QUESTIONS	COs	RBT Levels	Marks
	Module - I			
1	a) State and explain Kirchhoff's laws.	CO1	L1	06
	b) For the bridge circuit shown below, determine the current in all branches and power supplied by the source. 	CO1	L2	08
	c) Define Average value. Derive an expression for a sinusoidal signal.	CO1	L1	06
	OR			
2	a) Find the magnitude of total current and branch currents for the parallel combination, where $R_1 = 20\Omega$, $R_2 = 30\Omega$, V= 60 V.	CO1	L1	06
	b) Explain the generation of single phase AC voltage with a neat diagram.	CO1	L2	08
	c) The total power consumed by the network shown in Fig. is 16W. Find the value of R, power dissipated in R and total current. 	CO1	L1	06

	Module - II			
3	a) A 230V, 50Hz voltage is applies across an inductor of inductance 0.25H. Write the time equations for voltage and current.	CO1	L1	06
	b) For the network shown in Fig. Determine the real power, reactive power, apparent power and power factor.	CO1	L2	07
				
	c) Show that in a series R-C circuit current leads the voltage by an angle ϕ. Sketch the phasor diagram indicating the supply emf, current and voltage.	CO1	L2	07
	OR			
4	a) A 50μF capacitor is connected across a 230V, 50Hz ac supply. Find the reactance offered by the capacitor. Write the time equations of voltage and current.	CO1	L1	06
	b) Two impedances $Z_1 = (6 - j8)\Omega$ and $Z_2 = (16 - j12)\Omega$ are connected in parallel. If the total current of the combination is $(20 + j10)$ Amperes. Determine: i) Voltage across the combination, ii) Current in the two branches.	CO1	L2	07
	c) Obtain an expression for power in a series RLC circuit when applied by an ac.	CO1	L2	07
	Module - III			
5	a) List the differences between core and shell type transformer.	CO2	L1	04
	b) Explain the principle of operation and derive an EMF equation for a single phase transformer.	CO2	L2	08
	c) A 1-ϕ, 25KVA, 1000/2000V, 50Hz transformer has maximum efficiency of 98% at full-load, UPF. Determine its efficiency at: i. ¾ th full-load, UPF ii. ½ full-load, 0.8 p.f. iii. 1.25 full-load, 0.9 p.f.	CO2	L3	08
	OR			
6	a) What is a transformer?	CO2	L1	04
	b) With a neat diagram, explain the types and construction of single phase transformer.	CO2	L2	08
	c) A 1-ϕ transformer has 400 primary and 1000 secondary turns, the net cross sectional area of the core is 60cm^2. The supply is 500V, 50Hz. Determine: i. The peak value of the flux density. ii. Voltage induced in the secondary. iii. The number of secondary turns to induce a voltage of 2500V.	CO2	L3	08

	Module - IV			
7	a) Define Back E.M.F.	CO3	L1	04
	b) Explain the significance of Back E.M.F.	CO3	L2	08
	c) An 8 pole D.C. generator has 500 armature conductors and has a useful flux per pole of 0.065Wb. What will be the emf generated if it is lap connected and runs at 1000 r.p.m.? Also determine the speed at which it has to be driven to produce the same emf if it is wave wound?	CO3	L3	08
	OR			
8	a) List the applications of D.C. generators.	CO3	L1	04M
	b) Explain the principle of operation of D.C. Machine as a generator and motor.	CO3	L2	08M
	c) A short shunt, compound generator delivers a load current of 50A at 500V and has armature, series field and shunt field resistances of 0.05Ω, 0.03Ω and 250Ω respectively. Calculate the generated emf and the armature current. Allow 1.0V per brush for contact drop.	CO3	L3	08M
	Module - V			
9	a) Explain the concept of rotating magnetic field and show that resultant stator magnetic field has a constant magnitude.	CO4	L2	10M
	b) A 3 phase, 50Hz, 16 pole generator with star connected winding has 144 slots with 10 conductors/slot. The flux per pole is 4.8mWb, is sinusoidally distributed. The coils are full pitched. Determine speed and the line emf.	CO3	L3	10M
	OR			
10	a) With a neat diagram, explain the construction details of an alternator.	CO4	L2	10M
	b) A 3 phase induction motor with 4 poles is supplied from an alternator having 6 poles and running at 1000 rpm. Determine: i) Synchronous speed of induction motor ii) Its speed when slip is 0.04 iii) Frequency of the rotor emf, when the speed is 600 rpm.	CO3	L3	10M

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