College of Engineering, Pune

End Semester Exam – First Sem 2012

F. Y. B. Tech. (Non Electrical Branches)

(EE101)- (Basic Electrical Engineering)

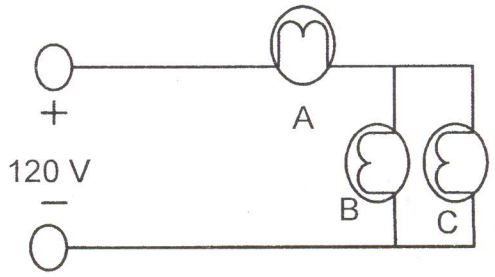
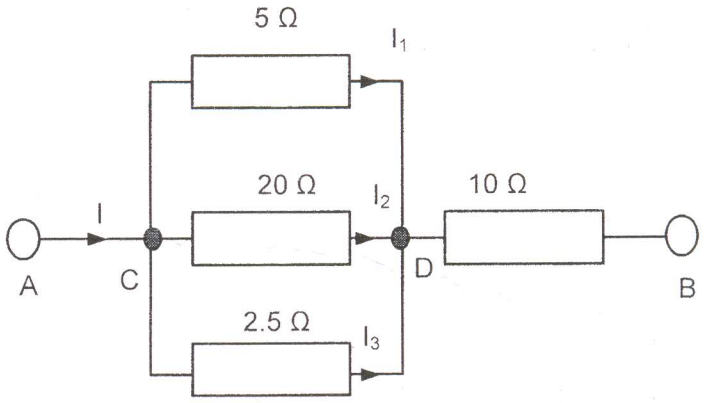
Elect

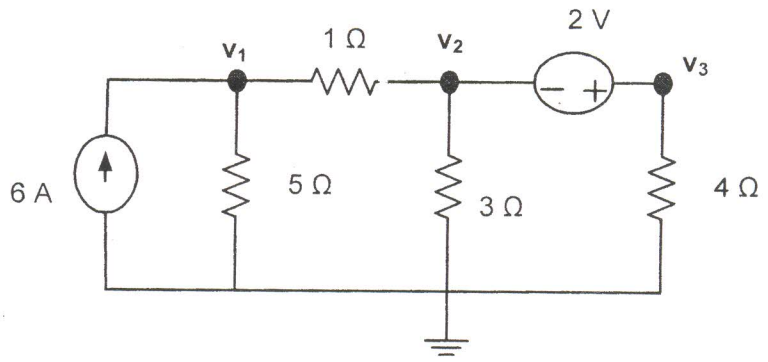
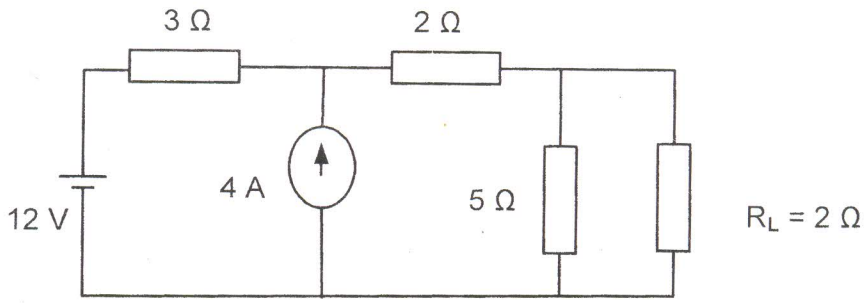
Day & Date: Sunday 2nd December 2012 | Time: 10 am to 1pm

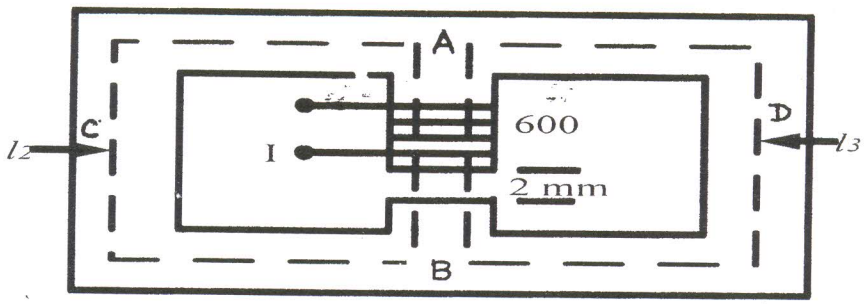
Maximum Marks: 50 | Duration: 3 hrs.

Instructions:

1. Solve any **FIVE** questions.
2. All questions must be attempted sequentially.
3. Sub-questions of each question must be attempted at one place.
4. All the symbols and notations carry their usual meaning unless otherwise stated.
5. Assume suitable data wherever necessary.

Q. 1	A	Three 60 W, 120 V light bulbs are connected across a 120 V power line as shown in figure given below. Find (i) voltage across each bulb, (ii) total power dissipation in the three bulbs. 	4
	B	In the network shown in the figure below, the total power dissipated is 488 W. Determine the current flowing in each resistance and the potential difference between A and B. 	3

	C	Find the node voltages v_1, v_2, v_3 for the circuit shown below.  	3
Q. 2	A	Using Norton's theorem, determine the power consumed by 2 Ω resistor R_L in the network shown below.  	5
	B	A three phase delta connected load consists of three similar inductive coils, each of resistance 40Ω and inductance 0.35 H. The supply is 415 V, 50 Hz. Calculate (i) line current (ii) power factor (iii) total power.	5
Q. 3	A	Three impedances $Z_1 = 8 + j6\ \Omega$, $Z_2 = 4 + j3\ \Omega$ and $Z_3 = 18 - j9\ \Omega$ are connected in series across the a.c. supply. If the voltage drop across Z_1 is $40 + j30$ volts, calculate (i) current in the circuit (ii) voltage drops across Z_2 and Z_3 (iii) total supply voltage (iv) total power consumed by the series circuit (v) power factor of the circuit.	5
	B	Draw a neat diagram showing constructional details of DC machine. State function of each of the components.	5
Q. 4	A	A single-phase, 150-kVA, 5000-V/250-V, 50 Hz transformer has the full load copper losses of 1.8 kW and the core losses of 1.5 kW. Find (i) number of turns in each winding for a maximum core flux of 60 mWb (ii) efficiency at half the full load, with unity power factor.	5
	B	The magnetic circuit shown in figure given below has following dimensions: l_1 (AB) =10 cm, l_2 (ACB) = l_3 (ADB) = 18 cm, cross sectional area of l_1 path = 6.25 cm^2, cross sectional area of l_2 and l_3 paths = 3 cm^2, length of air gap = 2 mm. Taking the relative permeability of the core material as 800, find the required current in the 600 turn exciting coil so as to establish a flux of 100 μWb	5

		in the air gap. Neglect leakage and fringing.  	
Q. 5	A	Two coils A and B are kept, such that 70% of the flux produced by coil A links with coil B. Coil A has 11000 turns and coil B has 13000 turns. A current of 4 amp in coil A produces a flux of 0.04 mWb while a current of 4 amp in coil B produces a flux of 0.08 mWb. Calculate (i) self inductances of both the coils (ii) mutual inductance (iii) coupling coefficient.	3
	B	The resistance of copper winding of a motor at room temperature of 20^0C is 3.42Ω. After an extended operation of the motor at full load, the winding resistance increases to 4.22 Ω. Find the temperature rise. Given that the temperature coefficient of copper at 0^0C is 0.00426 /^{0}C.	4
	C	A 50 kVA, 1100/ 220 V, 50 Hz transformer has an HV winding resistance of 0.125 Ω and a leakage reactance of 0.625 Ω. The LV winding has corresponding values of 0.005 Ω and 0.025 Ω respectively. Find the equivalent impedance of the transformer referred to HV.	3
Q.6	A	With neat diagram, explain the working of fluorescent lamp.	4
	B	Answer any two of the following. (i) State laws of illumination. (ii) Compare fuse with MCB as a protective element. (iii) Explain the need of (a) grounding (b) lightning arrestor.	6

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