College of Engineering, Pune
End Semester Exam – May 2013
F. Y. B. Tech.
Basic Electrical Engineering EE-101

Day & Date: Tuesday, 30th April 2013   Time: -10.00 am to 1.00 pm.
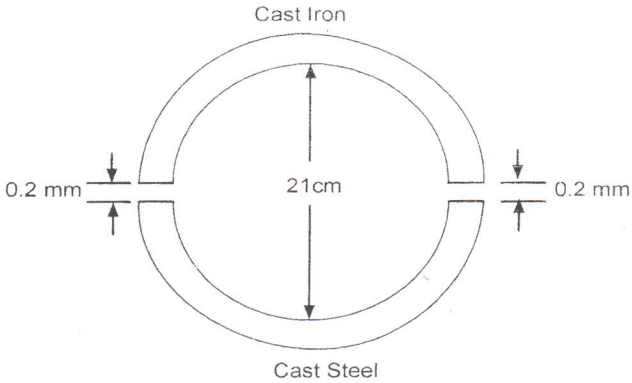Maximum Marks: 50   Duration – 3 hrs.

Instructions:
1. All questions are compulsory and carry equal marks.
2. All questions must be attempted sequentially 1 to 5.
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	Find the current in 10Ω resistor using Norton's Theorem.	5
	B	The resistance of copper winding of a motor at room temperature of 20°C is 3.42 Ω. 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°C is 0.00426 /°C.	5
Q. 2	A	Determine the node voltages for the circuit shown in Figure-2A Figure-2A	6
	B	Two coils connected in parallel across 100 V dc supply, take 10 A current from the supply. Power dissipated in one coil is 600 W. What is the resistance of each coil?	4

Q. 3	A	A coil of power factor 0.6 is in series with a 100μF capacitor. When connected to a 50 Hz supply, the potential difference across the coil is equal to the potential difference across the capacitor. Find resistance and inductance of the coil.	5
		OR	
	A	A choke coil has a resistance of 2Ω and an inductance of 5H. A capacitor 'C' is connected in series with the choke coil and the combination is fed from a 230V, 50Hz source. What would be the value of 'C' so that voltage across choke coil may be 250V?	5
	B	A star-connected three-phase load has a 6 Ω resistance and an 8 Ω inductive reactance in each branch. It is connected to a 220 V, 4-wire, 3-phase supply. Write the phasor expressions (as complex number) for voltages across each branch, for line voltages and for line currents. Also calculate the power consumed.	5
Q. 4	A	Full load efficiency of a 4000/400 V, 40 kVA single phase transformer is 94%. Maximum efficiency occurs at 90 % of the full load. Find iron loss and full load copper loss of the transformer. The load power factor being 0.8 lag.	5
	B	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
		OR	
	B	A ring having a mean diameter of 21 cm and a cross-sectional area of 10 sqcm is made up of semicircular sections of cast iron and cast steel with each joint having an air gap of 0.2 mm, as shown in Fig. 4b. Determine the ampere turns required to produce a flux of 0.8 mWb. The relative permeabilities of cast iron and cast steel are 166 and 800 respectively. Neglect leakage and fringing.	5

Fig. 4b

Q. 5	A	How does an induction motor work? Explain.	2
	B	Why MCB is preferred over fuse for protection in electric installations?	2
	C	With the help of neat diagram, explain the working of fluorescent tube.	3
	D	How lightning phenomenon occurs? What are the remedies to overcome it?	3