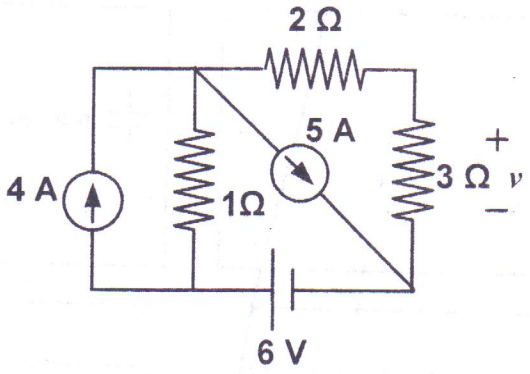
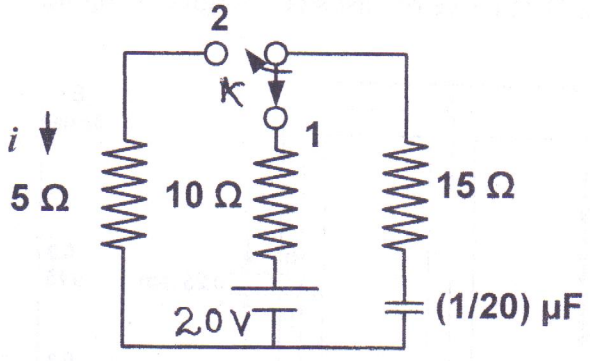
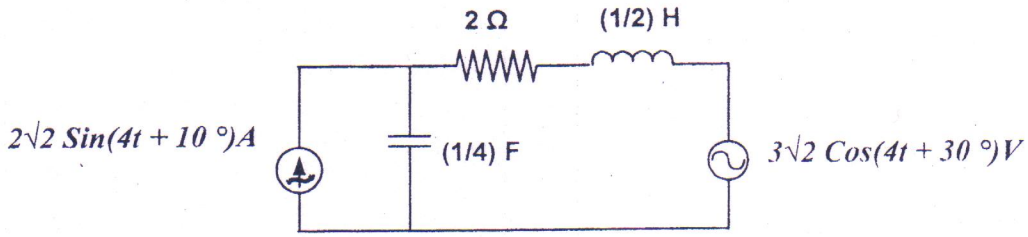
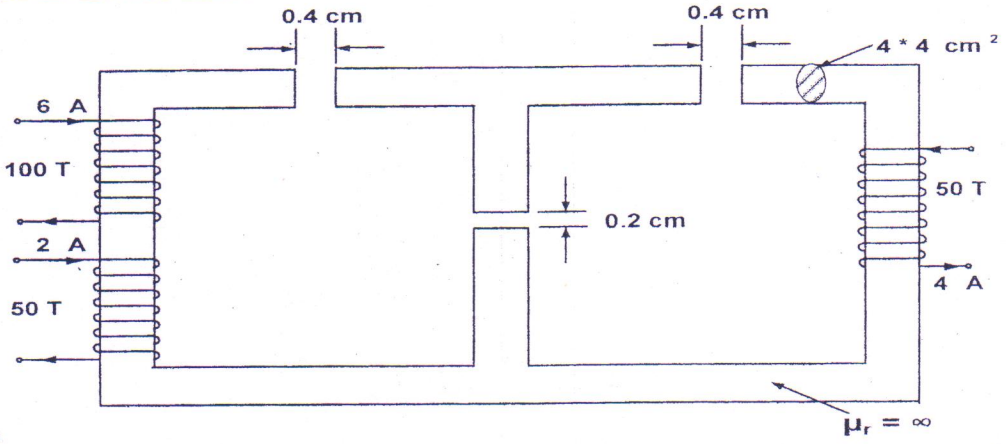
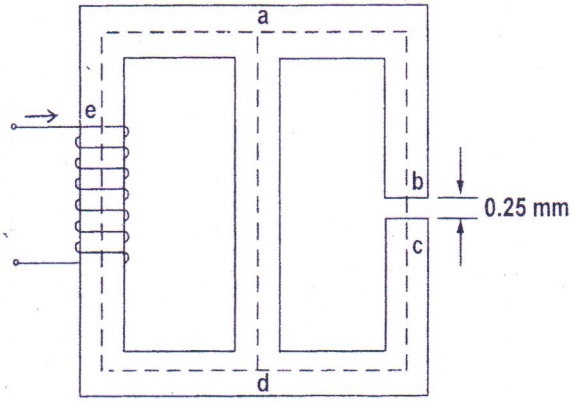
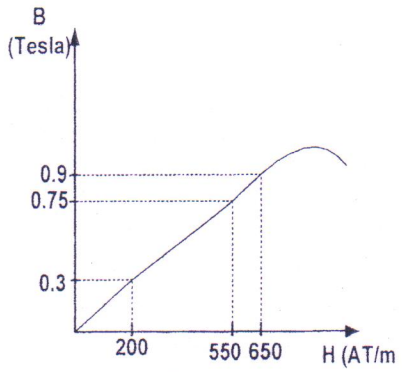
College of Engineering, Pune
End Semester Exam – May 2012
F. Y. B. Tech. (Electrical Group)
Basic Electrical Engineering EE-102

Day & Date: Sunday,13th May 2012 | Time: 9.00 am to 12.00
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 voltage *v* across 3 Ω resistor in the circuit shown in Figure-1A, by applying the principle of superposition. (without using source transformation).  Figure-1A	5
	B	In the circuit shown in Figure-1B, switch 'K' is at position 1 from long time. At t=0 sec, switch position is changed to 2. Find the current through 5 Ω resister at t=0 sec, t = 2τ and t = ∞. Sketch the current waveform.  Figure-1B	5

Q. 2	A	In the circuit shown in Figure-2A, determine the current *i(t)* using Thevenin's theorem.  Figure-2A	5
	B	Three equivalent impedances each of (8+j10) Ω are connected in star. This is further connected to a 440 V, 50 Hz, 3-phase supply. Determine the active and reactive power and the line and phase currents.	5
Q. 3	A	Consider the circuit shown in the Fig. below. Find the flux density in the air-gap of the middle limb.  	5
	B	The magnetic circuit shown in the Fig. 3B has a cast steel core whose dimensions are given below. Length (ab+cd) = 100 cm , cross-sectional area = 25 cm^2 Length (ad) = 40 cm , cross-sectional area = 12.5 cm^2 Length (dea) = 100 cm, cross-sectional area = 25 cm^2 Determine the exciting coil mmf required to establish an air-gap flux of 0.75 mwb. Use B-H curve of cast steel. Neglect fringing.   	5

Q. 4	A	A 40 kVA transformer with a ratio of 2000/250 V has a primary resistance of 1.15 Ω and a secondary resistance of 0.01555 Ω. Calculate (i) The total resistance in terms of the secondary winding (ii) Total resistance drop on full-load and (iii) Total copper loss on full-load	5
	B	The efficiency at unity power factor of a 200 kVA, 6600/600 V, single-phase transformer is 98 % both at full-load and half-load. Find the load for maximum efficiency with unity power factor. Also find the approximate current in high and low voltage winding of the transformer when it delivers this load.	5
Q. 5	A	Justify the following statements: i) Transformer is a constant flux machine ii) Fuse is a current operating protective device	4
	B	Draw circuit connection of fluorescent tube light. Explain its working.	3
	C	Why the induction motor never rotates at synchronous speed?	3