College of Engineering, Pune

End Semester Exam – May 2010

F. Y. B. Tech.

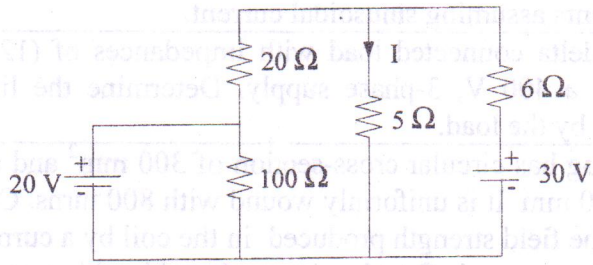
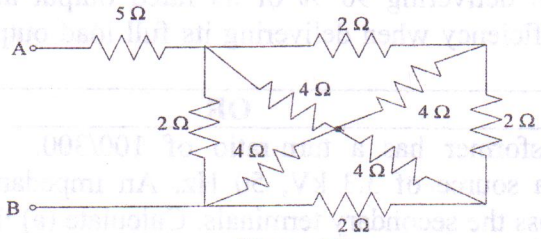
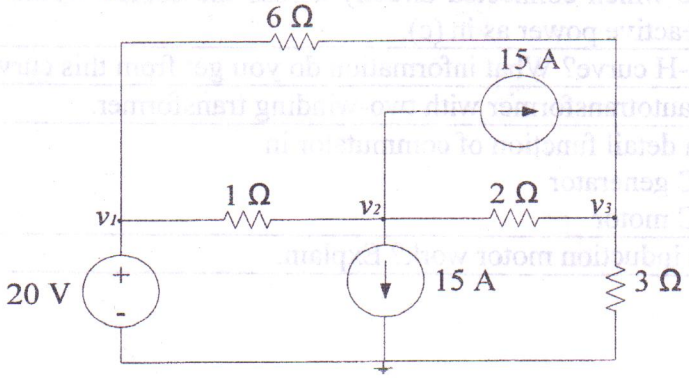
Basic Electrical Engineering EE-101

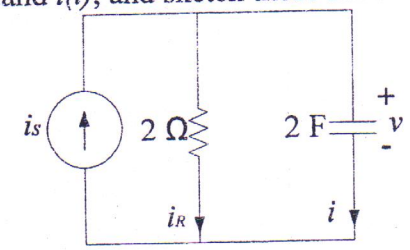
Day & Date: Friday, 14th May 2010 | Time: -10.00 am to 1.00 pm.

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	Use the superposition theorem to find current I in the circuit shown in Figure-1A. (without using source transformation).  Figure-1A	5
	B	Use star delta conversion to find resistance between terminals 'AB' of the circuit shown in Figure-1B.  Figure-1B	5
Q. 2	A	Find the node voltages for the circuit shown in Figure-2A  Figure-2A	5

	B	For the parallel *RC* circuit shown in Figure-2B suppose that $i_s(t)=6u(t)$ A. Find the step responses $v(t)$ and $i(t)$, and sketch these functions.  Figure-2B	5
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 non-ideal inductive circuit supplied with 100 V at 50 Hz is found to take 10 A and when supplied with 100 V at 200 Hz, it takes 5 A. Determine the circuit constants assuming sinusoidal current.	5
	B	A balanced delta connected load with impedances of (12+j16) Ω per phase connected to a 400 V, 3-phase supply. Determine the line current and the power drawn by the load.	5
Q. 4	A	A wooden ring has circular cross-section of 300 mm^2 and a mean diameter of the ring is 200 mm. It is uniformly wound with 800 turns. Calculate (i) The field strength produced in the coil by a current of 2 amperes (ii) The magnetic flux density produced by this current and (iii) The current required to produce a flux density of 0.02 wb/m^2	5
	B	A 10 kVA, 500/250 V, single-phase transformer has its maximum efficiency of 94 % when delivering 90 % of its rated output at unity power factor. Estimate its efficiency when delivering its full load output at power factor of 0.8 lagging.	5
		OR	
	B	An ideal transformer has a turn-ratio of 100/300. The LV winding is connected to a source of 3.3 kV, 50 Hz. An impedance of (100+j35)Ω is connected across the secondary terminals. Calculate (a) the value of maximum core flux, (b) the primary and secondary currents, (c) the real and reactive powers supplied by the source to the transformer primary, and (d) the value of impedance which connected directly across the source would draw the same real and reactive power as in (c).	5
Q. 5	A	What is B-H curve? What information do you get from this curve?	2
	B	Compare autotransformer with two-winding transformer.	3
	C	Explain in detail function of commutator in (a) DC generator (b) DC motor	2
	D	How does induction motor work? Explain.	3