## B.E. I & II First / Second Semester (Old) / (CBS Pattern) 104 - Basic Electrical Engineering

P. Pages : 3	* 1 1 5 4 *	GUG/W/18/1456	
Time : Three Hours		Max. Marks : 80	

- 2. All questions are compulsory however the students may avail internal choice.
- 3. Due credit will be given to neatness and adequate dimensions.
- 4. Assume suitable data wherever necessary.
- 5. Illustrate your answers wherever necessary with the help of neat sketches.
- 6. Use of slide rule, drawing instruments, and non programmable calculator is permitted.
- **1.** a) Convert the circuit to a single voltage source in series with single resistance between terminals A and B using source transformation.



b) Find current through branch AB by SPT.





- **2.** a) Draw phasor diagram of the following.
  - i) When resistor and inductor are connected in series.
  - ii) When resistor, inductor and capacitor are connected in series.

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A circuit having a resistance of  $5\Omega$ , an inductance of 0.4H and a variable capacitance in series, is connected across a 110V, 50Hz supply calculate. i) The value of capacitance to give resonance. Current at resonance. ii) iii) Voltage across inductance. iv) Voltage across capacitance. 8 3. Explain Magnetic leakage and fringing in details with neat sketch. a) A wooden ring has a circular cross-section of 300mm<sup>2</sup> and a mean diameter of the ring is 8 b) 200mm. It is uniformly wound with 800 turns. Calculate. i) The field strength produced in the core by a current of 2A, assume  $\mu_r = 1$ . The magnetic flux density produced by this current and ii) The current required to produce a flux density of  $0.02 \text{ wb/m}^2$ . iii) OR 4. Derive, EMF equation of a transformer. 4 a) What is meant by voltage regulation of a transformer? 4 b) c) A 10kVA, 440/220V, 50Hz single phase transformer gave the following test results when 8 both the following test were conducted on the high voltage side. Open circuit test : 440V, 1.0A, 100W Short circuit test : 20V, 22.7A, 130W Using the test data, calculate the efficiency and voltage regulation at 0.8 power factor lagging. 5. a) Describe various methods of speed control of DC machine. 8 A four pole, 500V, wave-wound dc shunt motor has 900 conductors on its armature. 8 b) Calculate the speed of the motor if its armature current is 80A. the flux per pole is 21mwb and armature resistance is  $0.1\Omega$ . OR What are the advantages and disadvantages of squirrel-cage induction motors over slip ring 6. a) 8 induction motors? b) The frequency of rotor induced EMF of 400V three phase, 50Hz, six pole induction motor 8 is 2Hz. Calculate speed of the motor. 7. Explain the constructional details and principle of working of a PMMC instrument. a) 8 Explain construction and working of HRC fuse and ELCB with neat sketch. 8 b)

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8.	a)	Explain the function of neutral wire and Earth wire in an electrical distribution system.	
	b)	Explain general layout and single line diagram of Electrical power system and functions of elements there in.	8
9.	a)	Explain BJT as an amplifier and as a switch.	8
	b)	Explain the operation of a Zener diode under forward and reverse biased condition.	8
		OR	
10.	a)	Explain NAND and NOR gates as universal gates.	8
	b)	Minimize with the help of k-Map $F(A, B, C, D) = \sum m(1, 3, 4, 6, 8, 9, 11, 13, 15) + \sum d(0, 2, 14).$	8

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