

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. II Year (E.E.E.) I-Semester (Main) Examinations, December - 2015**

**Electrical Circuits - I**

Time: 3 Hours

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE questions from Part-B*

**Part-A (10 × 2 = 20 Marks)**

1. Define "Resistance" and mention the factors on which it depends.
2. Write the difference between a dependent voltage source and independent voltage source.
3. The average value of an A.C. quantity is 10 units. Find its RMS value.
4. What is the difference between a phasor & a vector? Also mention the conditions to be satisfied so that a sinusoidal quantity can be represented as a vector.
5. Distinguish between Thevenin & superposition theorems.
6. Find  $I_{AB}$  (current through branch AB) for the circuit shown in Fig. 1

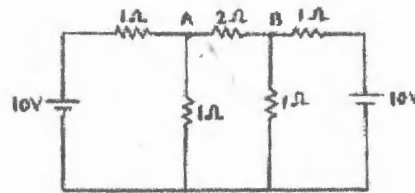


Fig.1

7. Define half power frequencies. Justify why they are called Half power frequencies.
8. Draw the graph of  $X_L$  vs. frequency with respect to a series RLC circuit.
9. Write the advantages of 3 $\phi$  system over a 1 $\phi$  system.
10. For a two-port network the z-parameters are 0.9, 0.2, 0.2 & 0.6. Find  $y_{22}$ .

**Part-B (5 × 10 = 50 Marks)**

11. a) Find the equivalent current source for the circuit shown in Fig.2. [4]

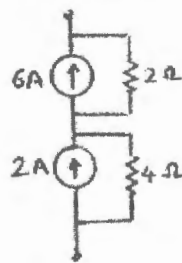


Fig. 2

- b) Deduce the current 'I' in the circuit shown in Fig.3. All resistances are in ohms. [6]

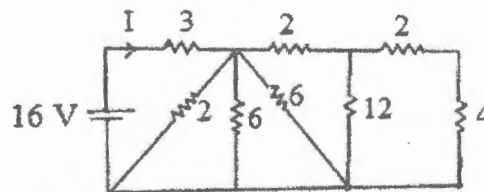


Fig. 3

Contd... 2

12. a) Two impedances  $5-7j$  and  $4+6j$  are connected in parallel across  $100 \angle 50^\circ$  V. [5]  
 Determine the power triangle.
- b) An alternating voltage is represented by  $v = 141.4 \sin(377t)$ . Find [5]  
 i) The maximum value  
 ii) Frequency  
 iii) Time period  
 iv) The instantaneous value of voltage when  $t$  is 3ms.

13. a) State and explain Maximum power transfer theorem with respect to AC circuit. [5]  
 b) Using Thevenin's theorem, find the current through  $5\Omega$  resistor for the circuit shown in Fig. 4. [5]

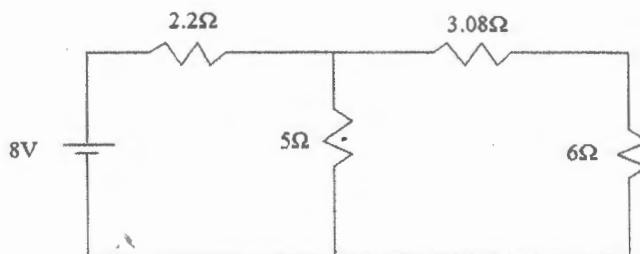


Fig. 4

14. a) Obtain the tie-set matrix for the graph shown in Fig.5 by considering 2, 3 and 4 as twigs. [5]  
 b) Obtain the  $L_{eq}$  between terminals A and B for the circuit shown in Fig.6 [5]

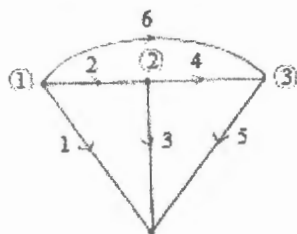


Fig.5

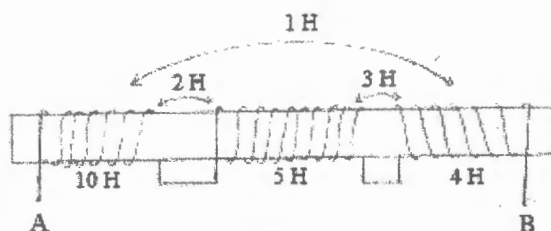


Fig.6

15. a) Derive the relationship between 'z' & 'h' parameters. [5]  
 b) A 3  $\phi$ , 3 wire, 110V, RYB system supplies a delta connection of three equal impedances of  $5 / 45^\circ$  Ohms. Determine the line currents  $I_R$ ,  $I_Y$  &  $I_B$  and draw the phasor diagram. [5]
16. a) Write a note on Source transformation. [4]  
 b) A coil takes a current of 1A at 0.6 lagging power factor from a 220V, 60Hz, single phase, 60Hz supply. If the coil is modeled by a series RL circuit find [6]  
 i) Complex power in the coil  
 ii) Values of R & L.
17. Answer any *two* of the following: [5]  
 a) State & explain Reciprocity theorem for AC networks. [5]  
 b) Derive for resonance frequency in series R-L-C circuit and half power frequencies. [5]  
 c) Show that 'h' parameters are convenient for the combination of two networks with their inputs in series and outputs in parallel. [5]