B.E. / B.Tech. Instrumentation Engineering (Model Curriculum) Semester-III

IN305 - Network Theory

P. Pages : 4 **GUG/W/24/14013**

Time : Three Hours * 5 5 5 4 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.

1. a) Write the node equations and determine the currents in each branch for the network shown in fig. 1 (a). **8**

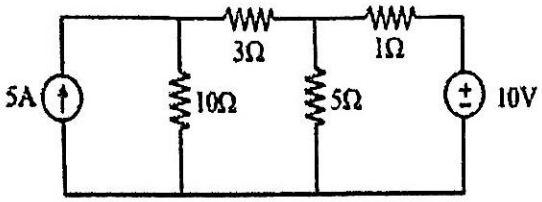

Fig. 1(a)

b) Define and illustrate the following term with an example: **8**
i) Supermesh ii) Supernode

OR

2. a) Find the power delivered by the 50V voltage source in the circuit shown in figure 2(a) using source transformation. **8**

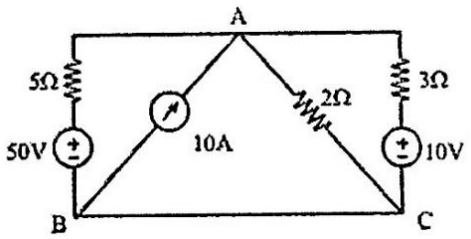

Fig. 2 (a)

b) Find the current passing through 5Ω resistor for the circuit shown in fig. 2(b) using nodal method. **8**

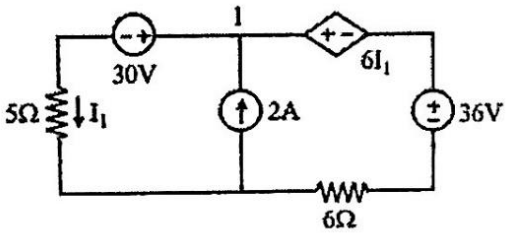

Fig. 2 (b)

3. a) Find the Norton's equivalents for the circuit shown in fig. 3 (a) with respect to terminals AB. **8**

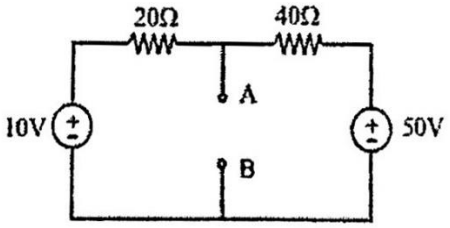

Fig. 3 (a)

b) State and derive the condition for maximum power transfer from source to load in d.c. circuits. **8**

OR

4. a) Calculate the current I in the figure below by using Millman's theorem. **8**

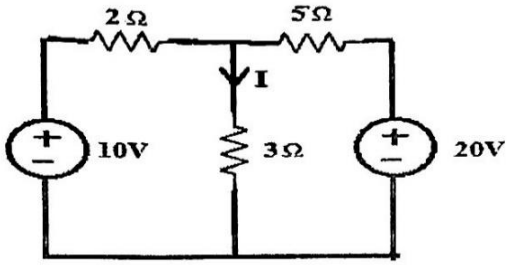

Fig. 4 (a)

OR

b) Verify the reciprocity theorem for the circuit shown in fig. 4 (b) **8**

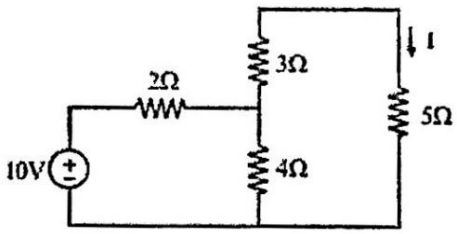

Fig. 4 (b)

5. a) Find out the complex impedance and impedance diagram for a series R-L circuit. **8**

b) Determine the total impedance Z_T, current I, phase angle θ, and voltage across each element in the circuit shown in fig.5 (b) **8**

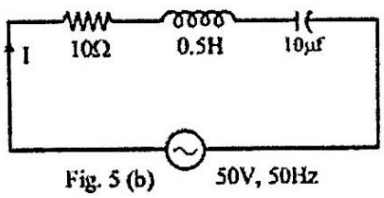

Fig. 5 (b)

OR

6. a) Define apparent power and power factor. A sinusoidal voltage v = 50 sin wt is applied to a series RL circuit. The current in the circuit is given by i = 25 sin (wt-53°). **8**
Determine : a) Apparent power b) Power factor c) Average power

b) Determine the values of the followings for the circuit shown in Figure 6. **8**
a) ZT b) IT c) θ

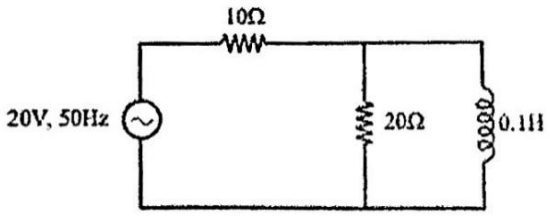

Fig. 6 (b)

7. a) Obtain the d.c. response of an R-L circuit shown in fig. 7(a). **8**

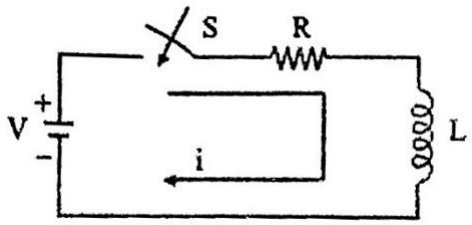

Fig. 7 (a)

b) Determine the current i, the voltage across resistor and the voltage across the inductor at t=0 as shown in figure 7 (b). **8**

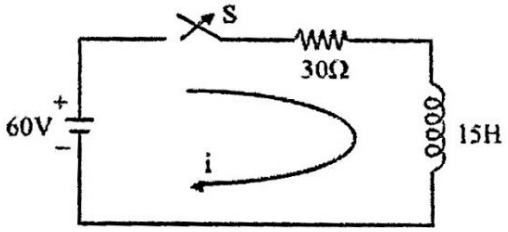

Fig. 7 (b)

OR

8. a) Obtain the current equation at t = 0 and also determine the voltage across the resistor and the capacitor for the circuit shown in figure 8(a). **8**

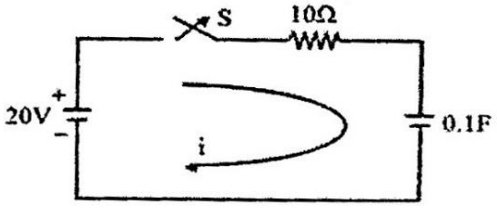

Fig. 8 (a)

b) Find the current transient equation when switch is closed at t = 0 as shown in fig. 8 (b). **8**

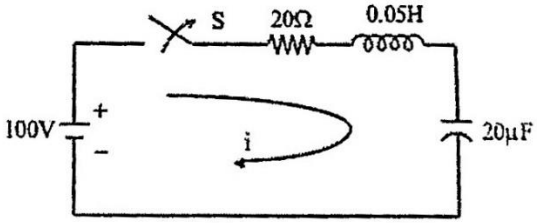

Fig. 8 (b)

9. a) Find h parameters for the circuit shown in fig. 9 (a). **8**

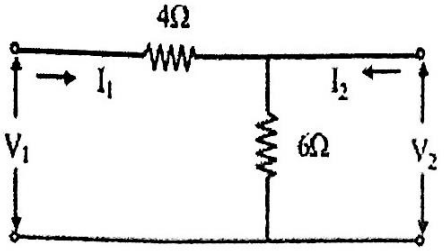

Fig. 9 (a)

b) Find the short circuit admittance parameters for the circuit shown in figure 9 (b). **8**

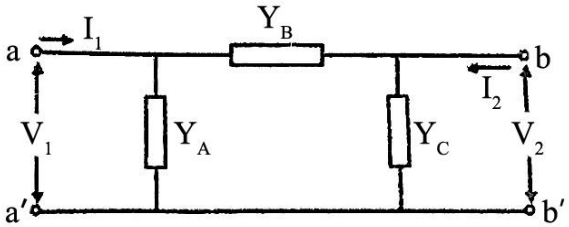

Fig. 9 (b)

OR

10. a) Find the Z parameters for the circuit shown in fig. 10 (a) **8**

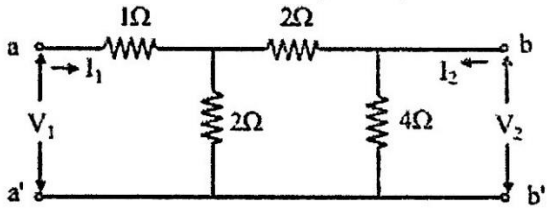

Fig. 10 (a)

b) Define and discuss transmission parameters (ABCD) of two port network. **8**

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