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

IN305 / IN305M - Network Theory

P. Pages : 4 **GUG/S/25/14013**

Time : Three Hours 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.
4. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Find the power dissipated in the 6Ω resistor for the circuit shown in fig. 1 using nodal analysis. **8**

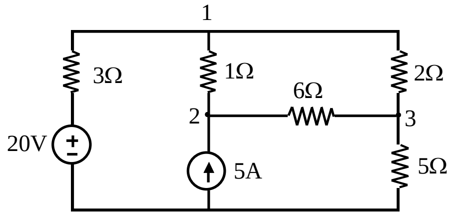

Figure 1

b) Write the mesh equations for the circuit shown in fig. 2 and determine the currents I_1, I_2 and I_3. **8**

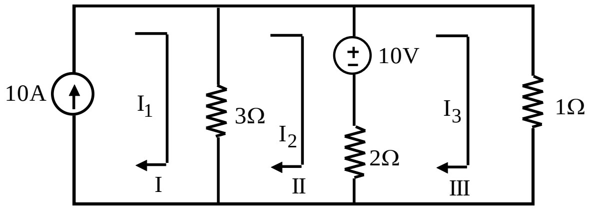

Figure 2

OR

2. a) State and explain Kirchhoff's voltage and current law with examples. **8**

b) Find the power delivered by the 50V voltage source in the circuit shown in figure 3 using source transformation. **8**

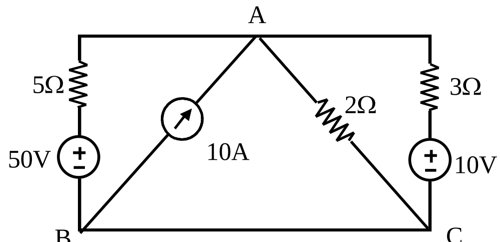

Figure 3

3. a) Find the Thevenin's and Norton's equivalents for the circuit shown in figure 4 with respect to terminals AB. **8**

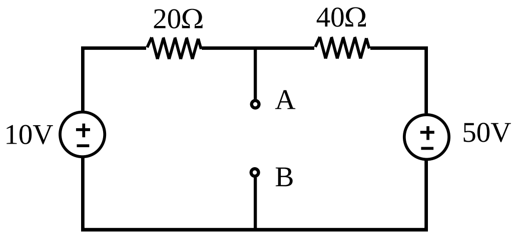

Figure 4

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

OR

4. a) Verify the reciprocity theorem for the circuit shown in fig. 5. **8**

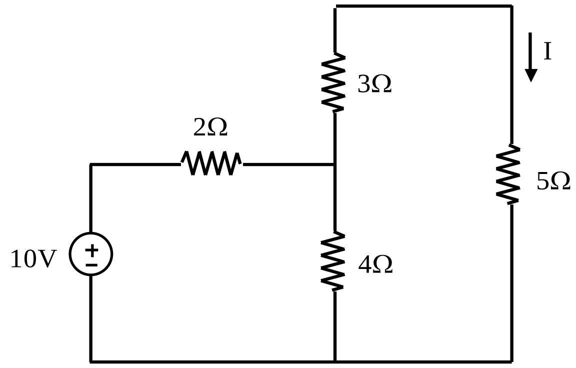

Figure 5

b) Calculate the current through 10Ω resistor using Millman's theorem for the circuit shown in fig. 6. **8**

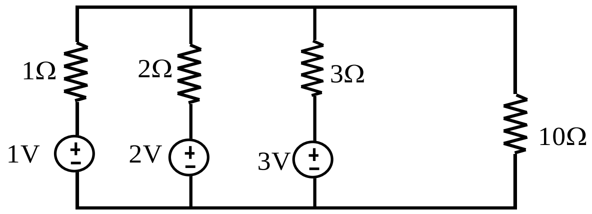

Figure 6

5. a) Find out complex impedance and impedance diagram for the following circuits. **8**

i) A series R-L circuit ii) A series R-C circuit.

b) 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 $i = 25 \sin(wt - 53^{o})$. **8**

Determine

a) Apparent power

b) Power factor

c) Average power

OR

6. a) A since-wave generator supplies a 10 kHz, 10V rms signal to a $1k\Omega$ resistor in series with a 50 mH inductor as shown in fig. 7. Determine the total impedance Z, current I, phase angle θ, inductive voltage V_L, and resistive voltage V_R. **8**

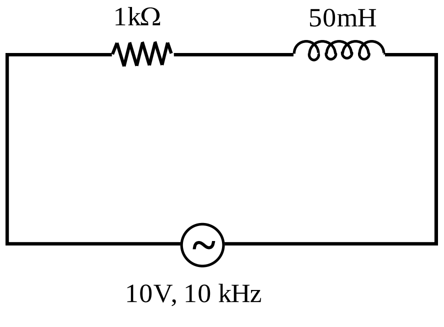

Figure 7

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

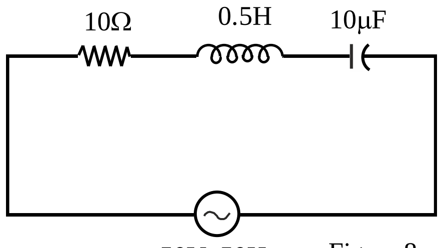

Figure 8

7. 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 9. **8**

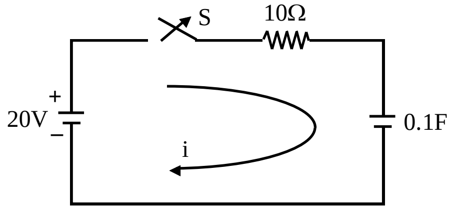

Figure 9

b) Find the current transient equation when switch is closed at t = 0 as shown in fig. 10. **8**

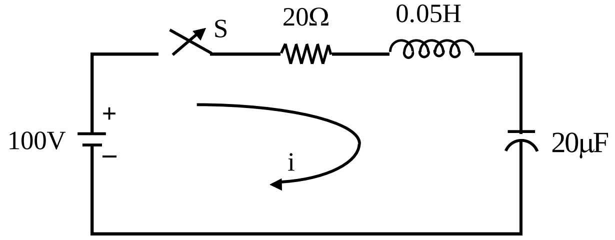

Figure 10

OR

8. a) Obtain d.c. response of an R-L circuit shown in figure 11. **8**

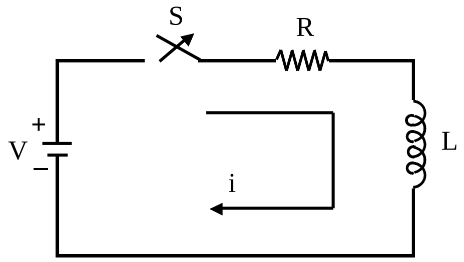

Figure 11

b) Obtain the current equation at t = 0 and also determine the voltage across the resistor and the capacitor, as shown in Fig. 12. **8**

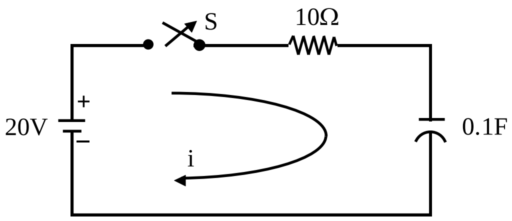

Figure 12.

9. a) Find the h parameters for the circuit shown in Figure 13. **8**

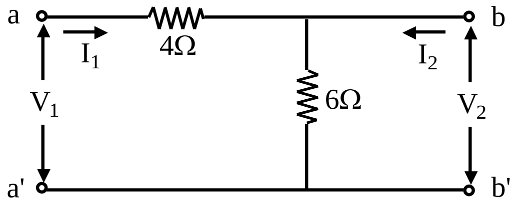

Figure 13

b) Find the short circuit admittance parameters for the circuit shown in figure 14. **8**

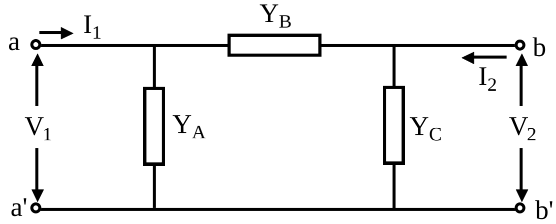

Figure 14

OR

10. a) Find the Z parameters for the circuit shown in figure 15. **8**

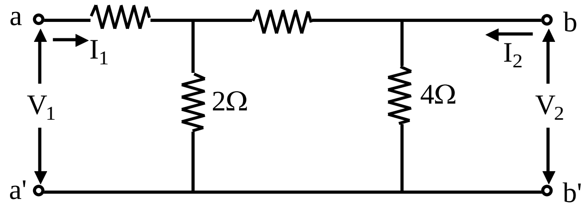

Figure 15

b) Find the ABCD parameters for the circuit shown in fig. 16. **8**

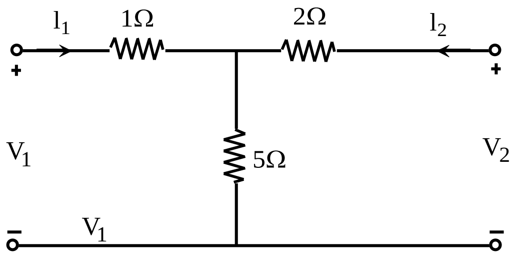

Figure 16

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