B.E. Instrumentation Engineering (C.B.C.S. Pattern) Sem-III

3BEIE03 - Network Theory

P. Pages : 4 **GUG/S/19/11513**

Time : Three Hours * 3 4 1 3 * 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) Find the value of R_1 & R_2 in the network sown in figure 1, using mesh analysis. **8**

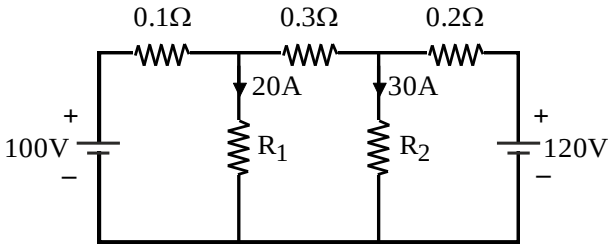

Figure 1

b) Find out the voltage across 40Ω and the power supplied by the 5A source using nodal analysis for the network shown in figure 2. **8**

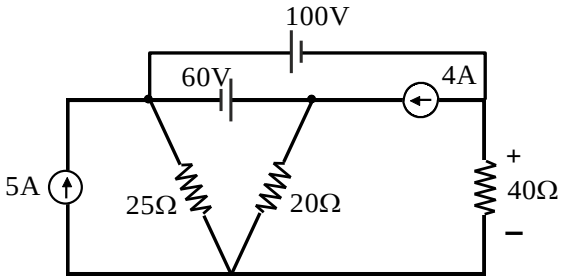

Figure 2

OR

2. a) Find out the power delivered to the 4Ω resistor using mesh analysis for the network shown in figure 3. To what voltage should the 100V battery be changed so that no power is delivered to the 4Ω resistor ? **8**

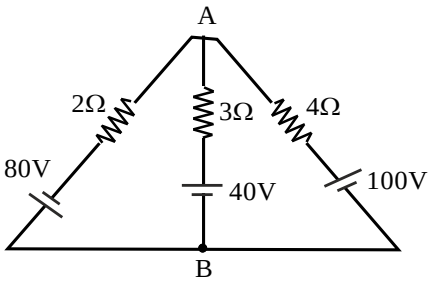

Figure 3

b) Write a short note on : **8**
i) Supermesh
ii) Supernode

3. a) State and discuss reciprocity theorem. **8**

b) Find the Thevenins and Norton's equivalents for the circuit shown in figure 4 with respect to terminal ab. **8**

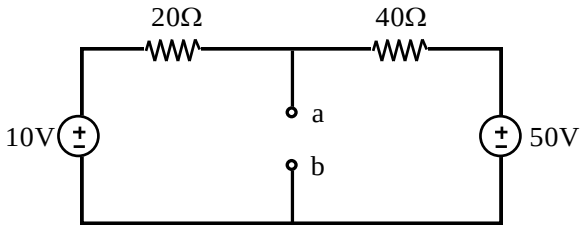

Figure 4

OR

4. a) State the maximum power transfer theorem for the d.c. circuits. Also derive the condition for maximum power transfer. **8**

b) Calculate the current I in the network shown in figure 5, using Millman's theorem. **8**

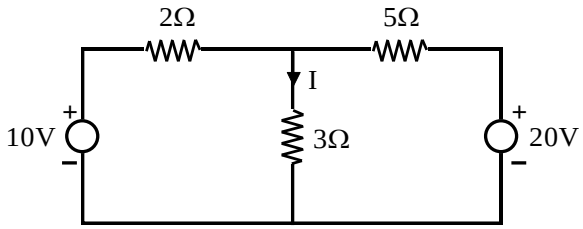

Figure 5

5. a) Obtain the expression for the complex impedance for the ckt shown in the figure 6. Also draw impedance diagram. **8**

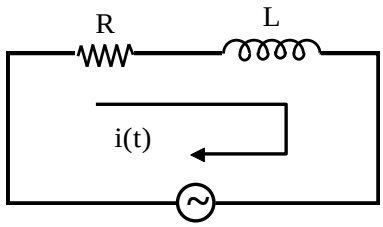

Figure 6

b) For the circuit shown in figure 7, a voltage V(t) is applied in the resulting current in the circuit i(t) = 15 sin(wt + 30°) A. Determine the active power, reactive power, power factor & the apparent power. **8**

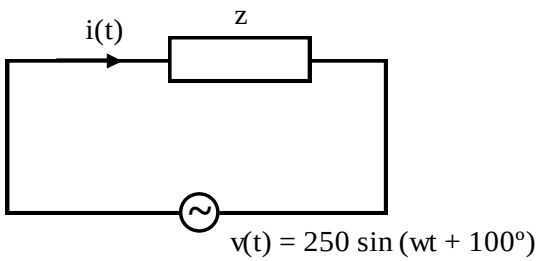

Figure 7

OR

6. a) Determine the equivalent impedance of the network shown in figure. 8. **8**

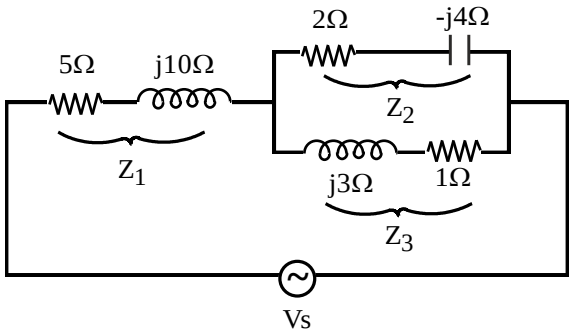

Figure 8

b) Two impedances, $z_1 = 10\angle -60^o\,\Omega$ & $z_2 = 16\angle 70^o\,\Omega$ are in series and pass an effective current of 5A. Determine the active power, reactive power, apparent power and power factor. **8**

7. a) Determine the Thevenins equivalent between the output terminals for the network shown in figure 9. **8**

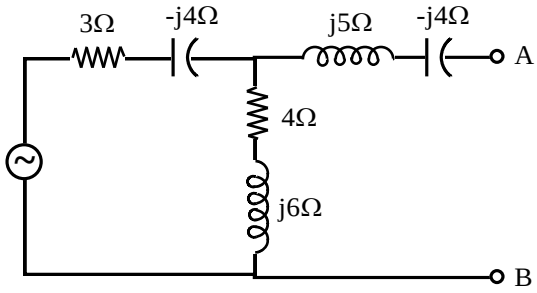

Figure 9

b) In the network shown in figure 10, the switch is moved from position 1 to position 2 at t=0. The switch is in position 1 for a long time. Determine the current expression i(t). **8**

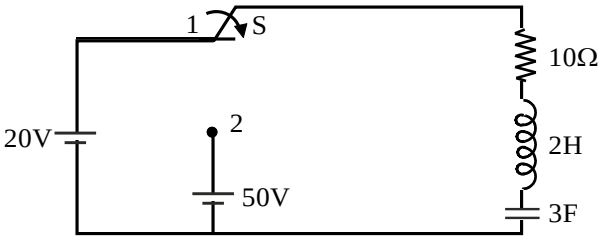

Figure 10

OR

8. a) In the circuit shown in figure 11, determine the current equations for i_1 and i_2 when the switch is closed at t = 0. **8**

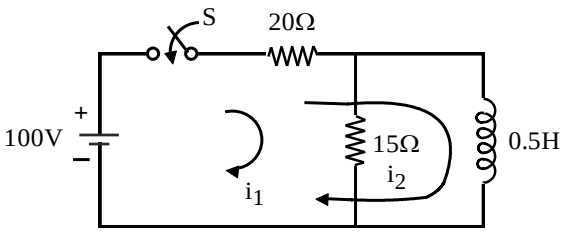

Figure 11

b) For the circuit shown in figure 12, find the value of z that will receive maximum power. Also determine this power. **8**

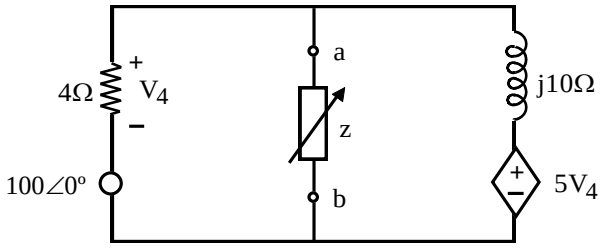

Figure 12

9. a) Find the Y-parameter for the network shown in figure 13. **8**

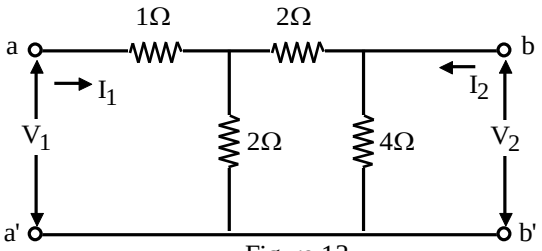

Figure 13

b) Define z-parameters for two port network. Also express the z parameters in terms of Y-parameters. **8**

OR

10. a) Find the h-parameters of the network shown in figure 14. **8**

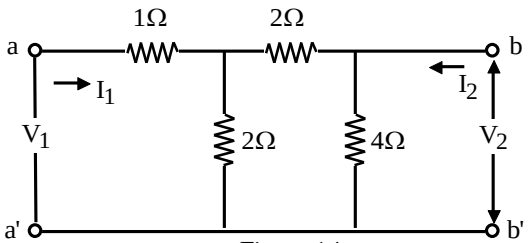

Figure 14

b) Define two-port networks discuss the open circuit impedance (z) parameters and short circuit admittance (Y) parameters. **8**

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