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

IN305M - Network Theory

P. Pages : 4 **GUG/S/23/14013**

Time : Three Hours * 2 7 5 0 * Max. Marks : 80

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

1. a) Determine the current in the 5Ω resistor for the circuit shown in fig. 1. **8**

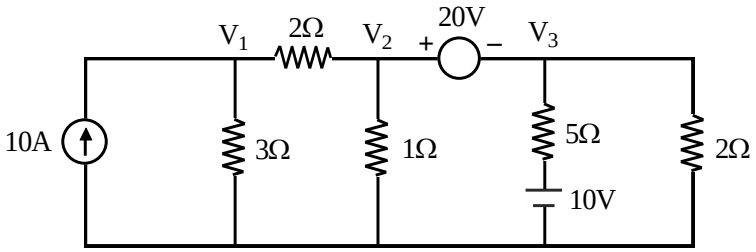

Fig. 1

b) Determine the current I in the circuit shown in Fig. 2 using loop analysis. **8**

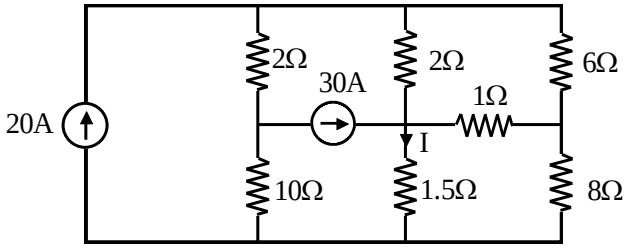

Fig. 2

OR

2. a) Find the power dissipated in the 6Ω resistor for the circuit shown in fig. 3 using nodal analysis. **8**

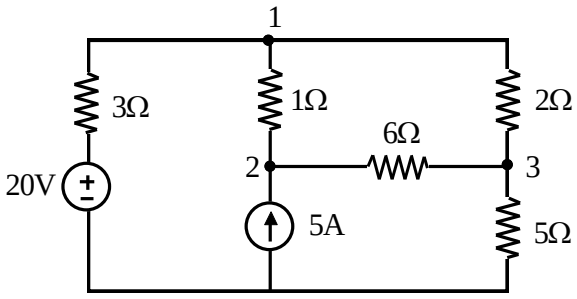

Fig. 3

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

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

b) Calculate the current through 10Ω resistor using Millman's theorem for the circuit shown in fig. 7. **8**

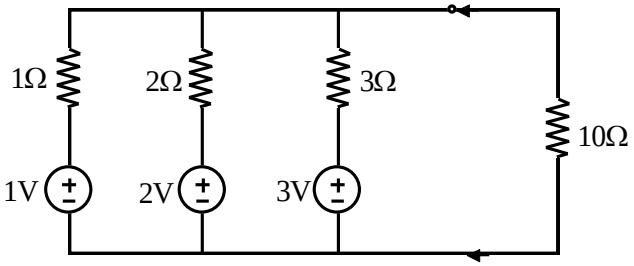

Fig. 4

OR

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

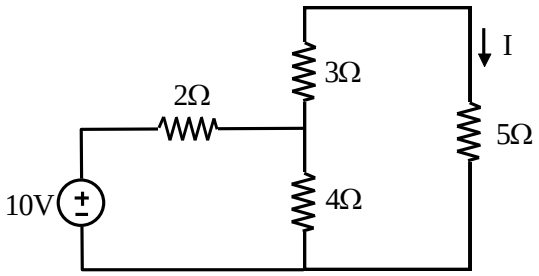

Fig. 5

b) Find the Thevenin's and nortons equivalents for the circuit shown in fig. 6 with respect to terminals AB. **8**

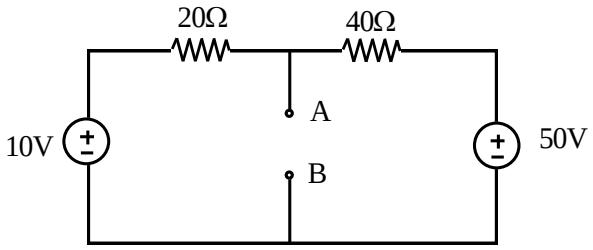

Fig. 6

5. a) Determine the values of **8**

i) Total impedance, Z_T ii) Total current, I_T

iii) Phase angle θ

for the circuit shown in fig. 7.

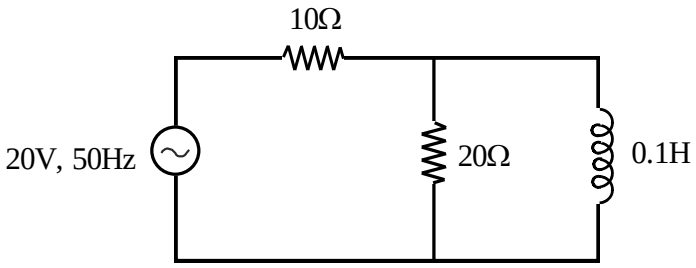

Fig. 7

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

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

OR

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

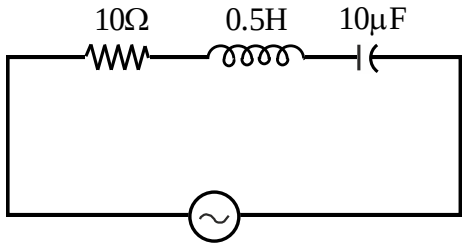

Fig. 8

b) A sine wave of $v(t) = 200\sin 50t$ is applied to a 10Ω resistor in series with a coil. The reading of a voltmeter across the resistor is 120V and across the coil, 75V. Calculate the power and reactive volt-amperes in the coil and the power factor of the circuit. **8**

7. a) Obtain d. c. response of an R-C circuit shown in fig. 9. **8**

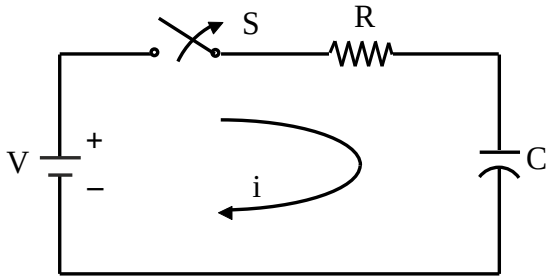

Fig. 9

b) Determine the current I, the voltage across resistor and inductor at t = 0 as shown in fig. 10. **8**

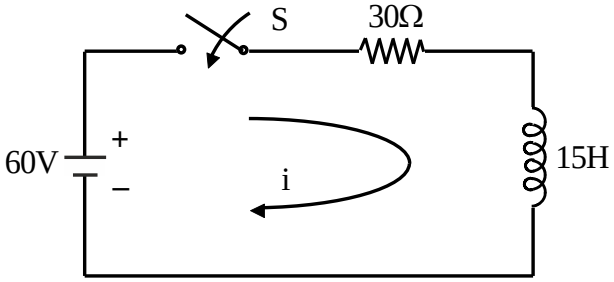

Fig. 10

OR

8. a) Obtain the current equation at t = 0 and also determine the voltage across the resistor and the capacitor, as shown in Fig. 11. **8**

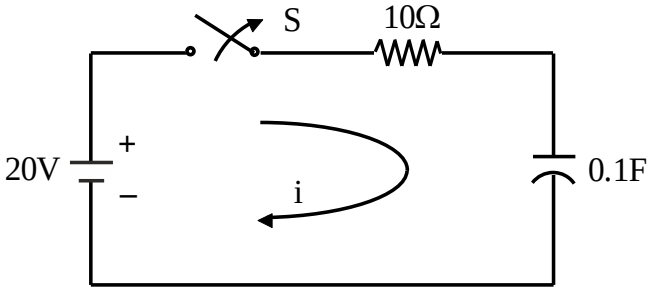

Fig. 11

b) Find the current transient equation when switch is closed at t = 0 as shown in fig. 12 **8**

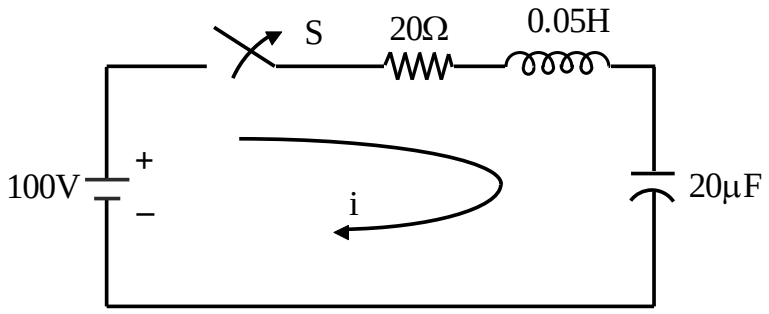

Fig. 12

9. a) Find out the inter relationship between (Z) and (Y) parameters. **8**

b) Find the transmission parameters for the circuit shown in fig. 13 **8**

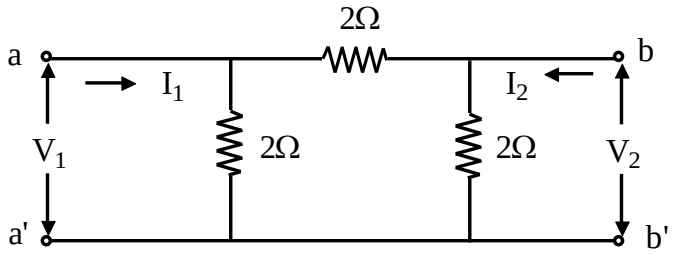

Fig. 13

OR

10. a) Find h parameters for the circuit shown in fig. 14. **8**

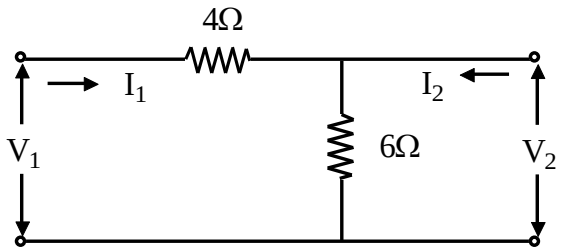

Fig. 14

b) Find the Z parameters for the circuit shown in fig. 15 **8**

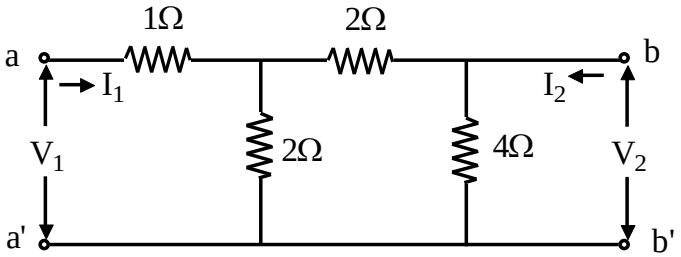

Fig. 15

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