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**MLR 16**

**Code No: A2EC01**

# MLR INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

I B.Tech I Sem Regular Examinations, December -2016

**NETWORK ANALYSIS**

(ECE)

Time: 3hours Max.Marks:75

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 25 marks. Answer all Questions in Part A.
3. Part B consists of 5 units. Answer any one full question from each unit.
Each question carries 10 Marks and may have a,b,c as sub sections.

**PART-A**

1. a) A current source of 3A is connected in parallel with a practical voltage source of 6V having internal resistance 10Ω. Find the effective voltage across the current source. **2M**

   b) A network contains only independent current sources and resistors. Find the values of node voltages, if the values of all resistors are doubled. **2M**

   c) A series circuit has R = 4Ω and L = 10mH. Find the impedance offered by the circuit when excited with voltage of 50 Hertz frequency. **2M**

   d) State Reciprocity theorem. **2M**

   e) Draw the dual of the series RLC circuit excited by a voltage source. **2M**

2. a) Illustrate the relationship between voltage and current operation in (i) Resistor (ii) Inductor and (iii) Capacitor **3M**

   b) Each branch of Delta circuit has an impedance of 3 Ω. Find the each branch impedance of the equivalent Star circuit. **3M**

   c) A 4 Ω resistor is connected to a 10 mH inductor across a 100V, 50 Hz voltage source. Find (i) Input current (ii) Power factor and (iii) Real Power consumed by the circuit. **3M**

   d) Which Theorem is best suited for examining the active network under different load conditions? Justify your answer. **3M**

   e) Discuss the effect of increase of resistance in a RLC series circuit on (i) Bandwidth (ii) Resonant Frequency and (iii) power factor **3M**

**PART – B**

3. a) Find the current $i_1$ and $i_2$ in the circuit of Fig. 2.1 **4M**

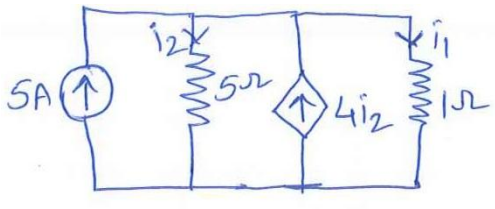


Fig. 2.1

b) Find $V_{a-b}$ in the circuit shown in Fig. 2.2 **6M**

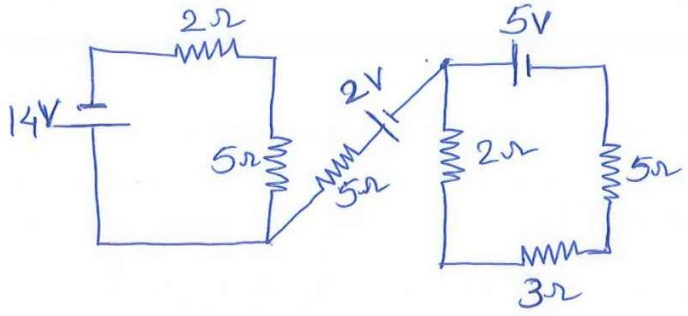


Fig. 2.2

**OR**

4. a) Determine the voltage across 10 Ω resistor in Fig. 2.3 **4M**

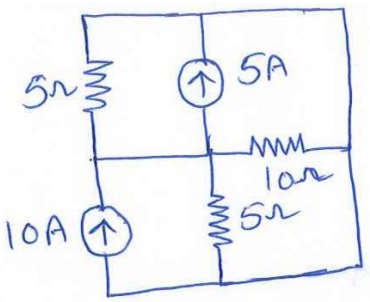


Fig. 2.3

b) Determine the voltage $V_{b-a}$ in the network shown in Fig. 2.4 **6M**

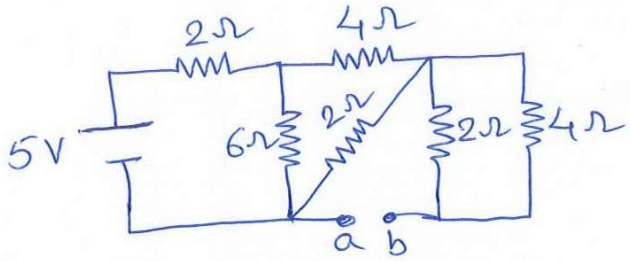


Fig. 2.4

5. Using Mesh analysis, find the current flowing through 2 Ω resistor in the circuit of Fig. 2.5 and thus power consumed by it. **10M**

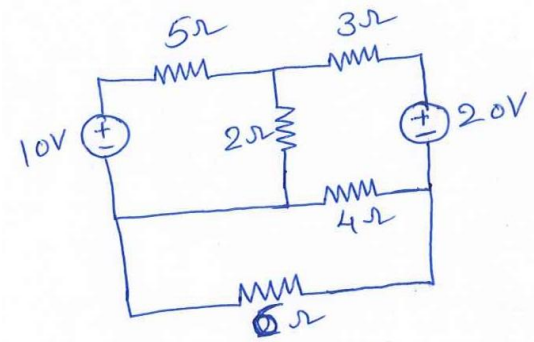


Fig. 2.5

**OR**

6. In the network configuration of Fig. 2.6, find the current and voltage drop in 5 Ω resistor using Nodal analysis. **10M**

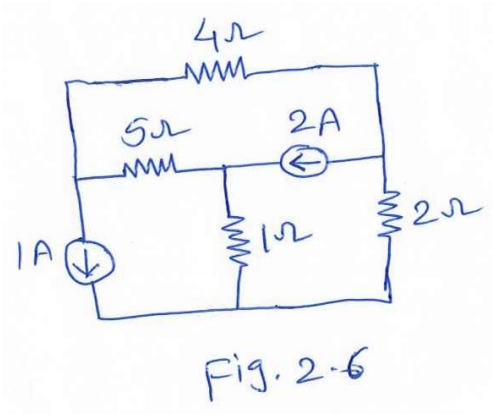

Fig. 2.6

7. a) Illustrate the relationship between Real, Reactive and Apparent Powers. Write the expressions for these. Also, write the expression for power factor. **4M**

b) Find the average and RMS values of the periodic wave form shown in Fig. 2.7 **6M**

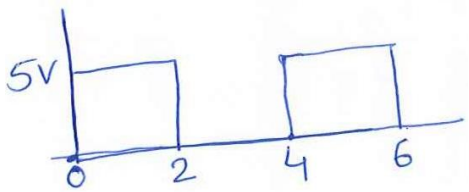

Fig. 2.7

**OR**

8. a) A series RLC circuit of R = 3 Ω, L = 7 Ω and C = 3 Ω is excited by a sinusoidal voltage source of $50\angle 0^0$ V supply. Find the total power consumed and power factor of the circuit. **4M**

b) Find the average and RMS values of the periodic wave form shown in Fig. 2.8 **6M**

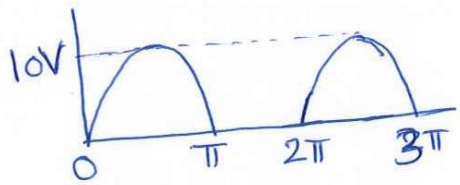

Fig. 2.8

9. Draw the Thevenin's equivalent of the circuit shown in Fig. 2.9 and find the load current. **10M**

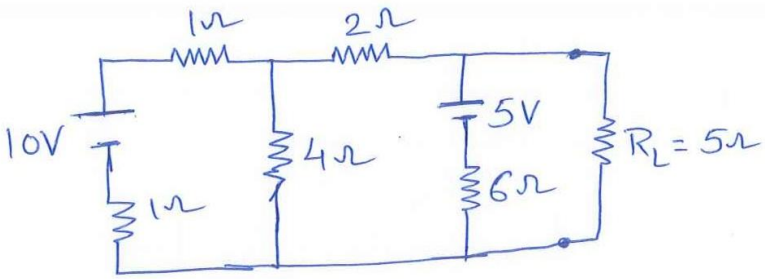

Fig. 2.9

**OR**

10. Find the current through 2Ω resistor in the circuit shown in Fig. 2.10 using Superposition Theorem. **10M**

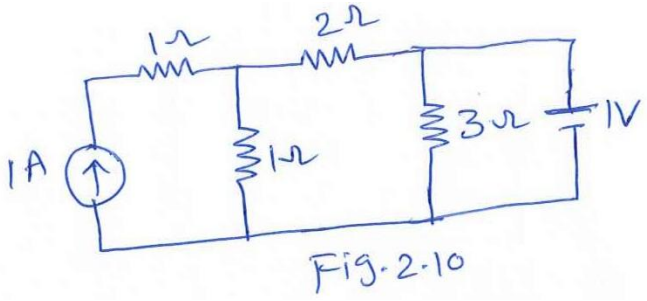

Fig. 2.10

11. a) Find the total impedance of the three series connected coupled coils in the Fig. 2.11. Given $L_1$=1H; $L_2$=2H; $L_3$=5H; $M_{12}$=0.5H; $M_{23}$=1H and $M_{13}$=1H **5M**

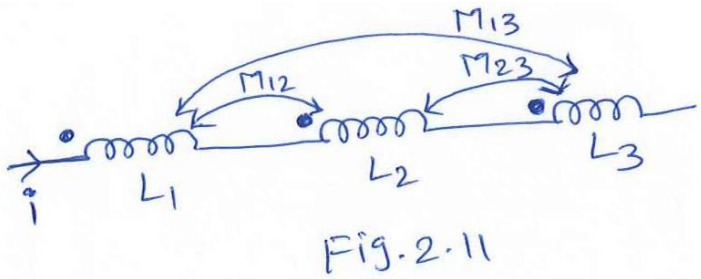

Fig. 2.11

b) List out the properties of Resonance of Parallel RLC circuit. **5M**

**OR**

12. a) Draw the Dual of the network shown in Fig. 2.12. **5M**

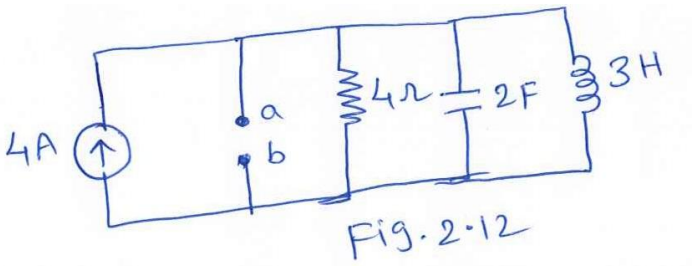

Fig. 2.12

b) Find the incidence matrix and reduced incidence matrix for the graph shown in Fig 2.13 **5M**