

Group - A

[Answer any two questions of the following sets]

1. a) Determine the node voltages in the circuit shown in Fig. 1

4

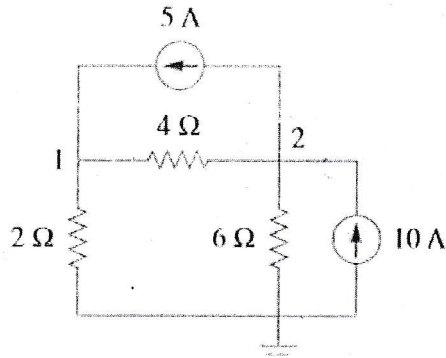


Fig.1

- b) Use Fig. 2 to determine mesh currents

4

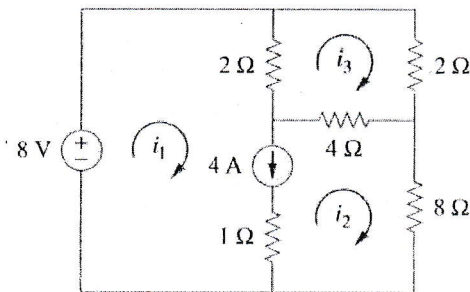


Fig. 2

- c) Point out when Supernode happens in Nodal Analysis.
2. a) By using superposition theorem examine the current through R_1 shown in figure 3.

2

5

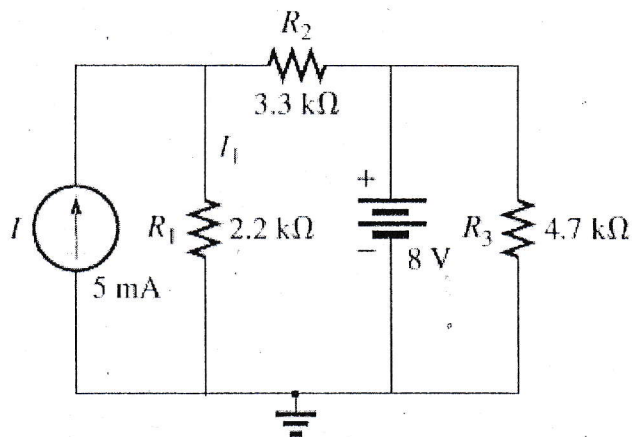


Fig: 3

- b) From the following data examine the current I through resistor R_4 in fig 4 by using

5

Reciprocity theorem. Where, $E = 45V$, $R_1 = 12\Omega$, $R_2 = 6\Omega$, $R_3 = 2\Omega$, $R_4 = 4\Omega$.

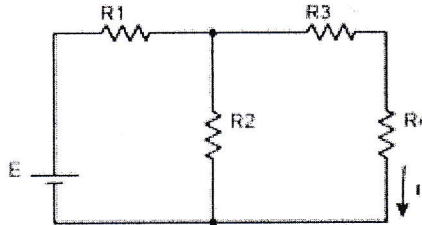


Fig: 4

3. a) Point out the differences between Thevenin's Theorem and Norton's Theorem. 2
- b) Using Thevenin's theorem, determine the equivalent circuit to the left of the a-b terminal in Fig. 5 and hence determine I. 5

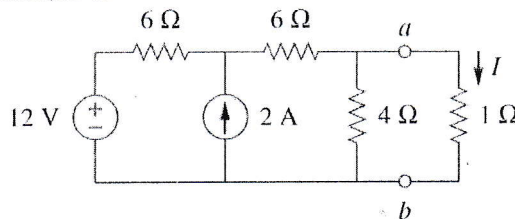


Fig. 5

- c) Explain Maximum Power Transfer Theorem in your own words. If a Thevenin's equivalent circuit has $R_{th} = 9\Omega$ and $V_{th} = 22V$, Determine the load resistance that will result in Maximum Power getting transferred to the load. Also determine the maximum power. 3

Group - B

[Answer any three questions of the following sets]

4. a) Design Thevenin equivalent circuit for the network in the shaded area in Fig. 6. 5

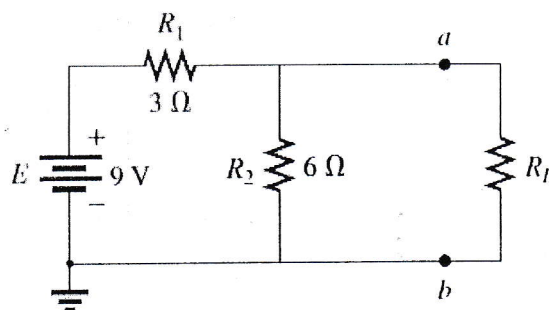


Fig: 6

- b) For the network of fig 7 examine the value of R_L for maximum power to R_L and evaluate the maximum power. Given $I = 6A$, $E_1 = 68V$, $R_1 = 3\Omega$, $R_2 = 10\Omega$, $R_3 = 2\Omega$. 5

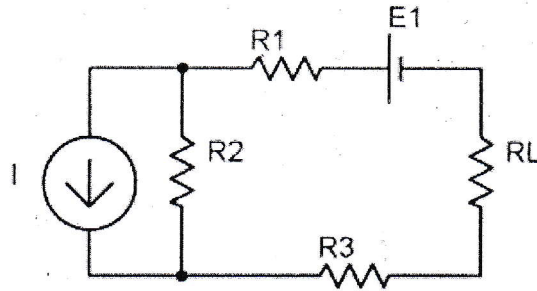
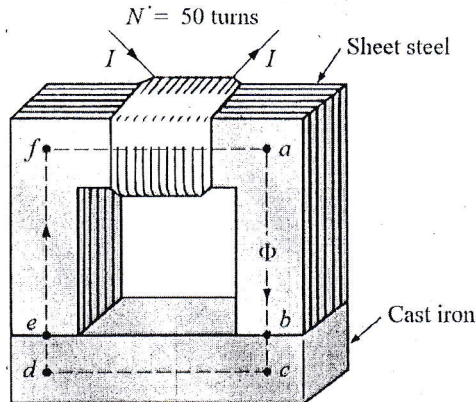


Fig: 7

5. a) Explain the equivalent Ohm's law of Magnetic Circuit. 2
- b) Explain Hysteresis curve with proper figure. 4
- c) For the electromagnet of Fig. 8, Determine the current I required to establish the indicated flux in the core. 4



$$l_{ab} = l_{cd} = l_{ef} = l_{fa} = 4 \text{ in.}$$

$$l_{bc} = l_{de} = 0.5 \text{ in.}$$

$$\text{Area (throughout)} = 1 \text{ in.}^2$$

$$\Phi = 3.5 \times 10^{-4} \text{ Wb}$$

Fig. 8

6. a) Point out why First order circuits are named so. 2
- b) Derive expression for voltage of a Source Free RL circuit. 4
- c) The switch in Fig. 9 has been in position A for a long time. At $t = 0$ the switch moves to position B. Determine $v(t)$ for $t > 0$ and calculate its value for $t = 1 \text{ s}$ and $t = 4 \text{ s}$. 4

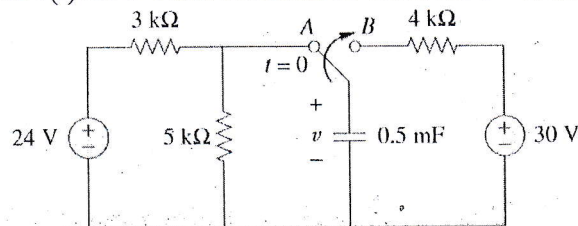


Fig. 9

7. a) Show that the energy store in an Inductor is $W = \frac{Li^2}{2}$. 3

- b) Determine the current through a $200\text{-}\mu\text{F}$ capacitor whose voltage is shown in Fig. 9. 3

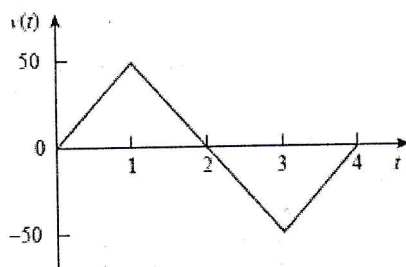


Fig: 9

- c) Consider the circuit in Fig. 10 and under dc conditions, examine:
 (a) i , v_C , and i_L ,
 (b) the energy stored in the capacitor and inductor. 4

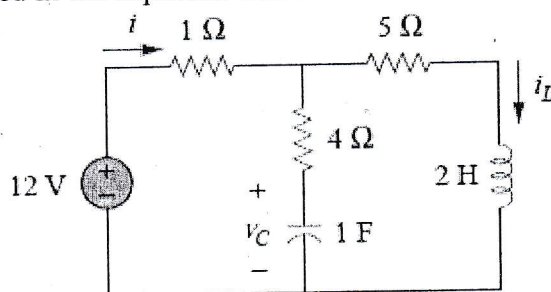


Fig: 10

