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- Prof. Dr. Engr. Md. Khalil Uddin
- Mohammad Raihan Khan



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University of Dhaka
Affiliated Engineering Colleges
Department of Computer Science and Engineering
1st Year 1st Semester B.Sc. Examination, 2020
EEE – 1103, Electrical Circuits

Total Marks: 70 Time: 2 Hours
(Answer any 3 (Three) of the following Questions)

1. a) Define open and short circuits with figures. 5
b) State and explain Kirchhoff's voltage law (KVL) and Kirchhoff's current law (KCL). 5.33
c) Find the equivalent resistance R_{ab} in the circuit of Fig. 1. 6

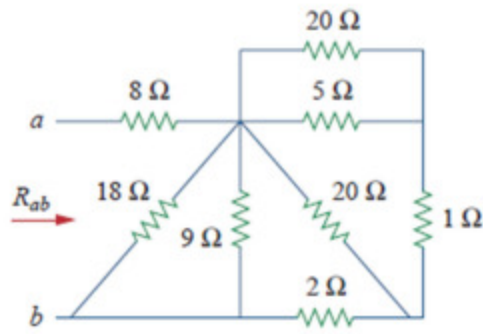


Fig. 1

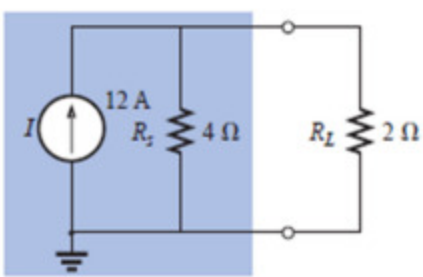


Fig. 2

- d) From the circuit of Fig. 2 find 7
(i) the current through 2 ohm resistor
(ii) Convert the current source and 4 ohm resistor to voltage source and again solve for the current in 2 ohm resistor.

2. a) Find the nodal voltages at points 1 and 2 of the following circuit of Fig. 3 7.33

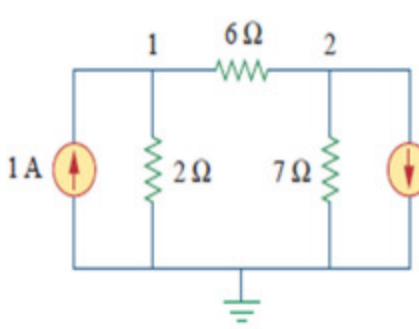


Fig. 3

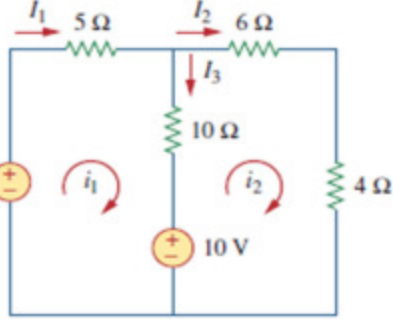


Fig. 4

- b) For the circuit in Fig. 4, find the branch currents I_1 , I_2 and I_3 using mesh analysis. 8
c) Using superposition, determine the current through 4 ohm resistor in Fig. 5. 8

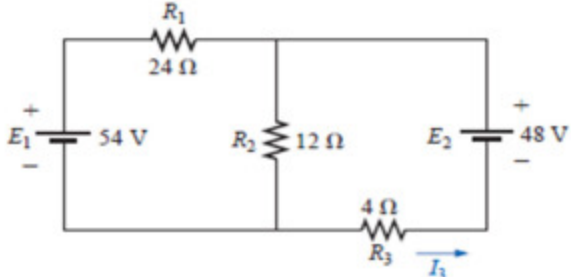


Fig. 5

3. a) State and explain superposition theorem. 4
b) Prove that "Any two-terminal dc linear circuit can be replaced by an equivalent circuit consisting solely of a voltage source and a series resistor". 5.33
c) Find the Thevenin equivalent circuit across the point a and b shown in Fig. 6. 7

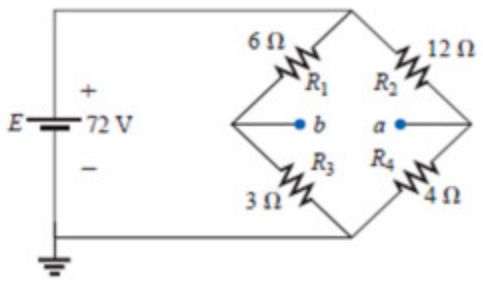


Fig. 6

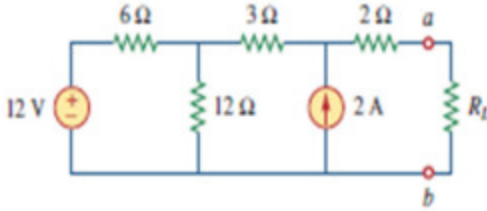


Fig. 7

- d) Find the value of R_L for maximum power transfer in the circuit shown in Fig. 7. Also, find the maximum power. 7
4. a) Define time period and frequency. Also show their relationship. 4.33
b) Define RMS value. Derive the RMS value equation for the sinusoidal ac voltage, $v(t) = V_m \sin \omega t$ 6
c) Define average power and power factor. Also derive the average power equation. 7
d) Calculate the phase angle between $v_1 = -10 \cos(\omega t + 50^\circ)$ and $v_2 = -12 \sin(\omega t - 10^\circ)$. State which sinusoid is leading. 6

5. a) Classify capacitor and inductor. 4
b) Derive the equation of energy stored in a capacitor. 6
c) Derive the equivalent capacitor equation for N number of series connected capacitors. 6.33
d) Find the equivalent capacitance seen between terminals a and b of the circuit in Fig. 8. 7

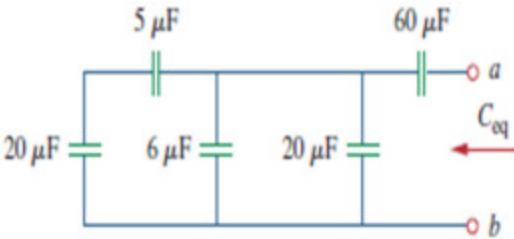


Fig. 8