Thapar Institute of Engineering and Technology (Deemed to be University)

DEPARTMENT OF ELECTRICAL AND INSTRUMENATION ENGINEERING

TUTORIAL 1 (BASIC LAWS)

UES 013 ELECTRICAL AND ELECTRONICS ENGINERING

FIRST YEAR (CSE) **Course Instructor: Dr. Shakti Singh**

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1. Use the KVL and KCL method to find how much power the 20-V source extracts from the circuit in Fig (60W)

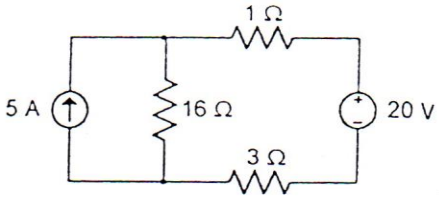

Figure 1

2. Referring to Figure 2
   a. Using KVL and KCL, find the branch currents i_a through i_e in the circuit.
   b. Find the total power developed in the circuit.

   (ans: a) 5.6 A, 0.6 A, 5 A, 0.2 A, 4.8 A b) 2048 W

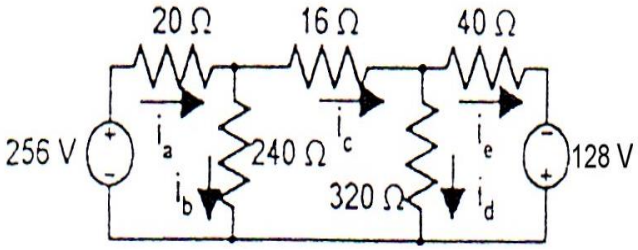

Figure 2

3. Using KCL and KVL Analysis, find v in Fig 3. (20 V)

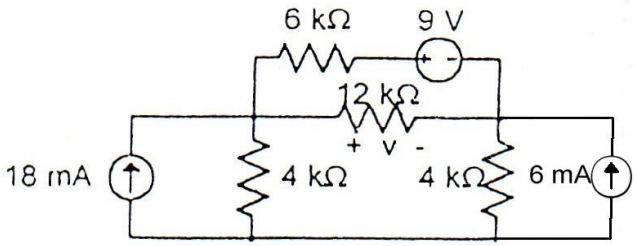

Figure 3

4.Find current in 100 ohms resistor in Figure 4, using KVL and KCL.

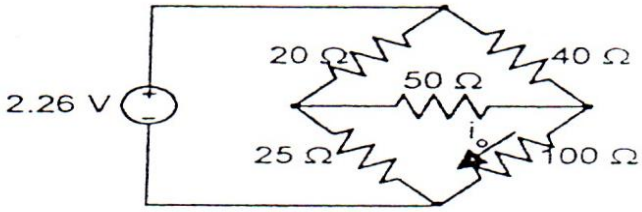

Figure 4

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TUTORIAL 2 (NODAL & MESH ANLYSIS)

UES 013 ELECTRICAL AND ELECTRONICS ENGINERING

FIRST YEAR (CSE) **Course Instructor: Dr. Shakti Singh**

Q1.Use the node-voltage method to find how much power the 20-V source extracts from the circuit in Fig 1 (60W)

Q2.Use the node-voltage method to find v_1 and v_2 in Fig 2 (100 V, 50 V)

Q3.Use the node-voltage method to find the power delivered by the dependent voltage source in Fig 3. (Ans: -750W)

Q4.Find v and i in Fig 4 using Nodal Analysis.
(ans : 0.46V, 2.23A)

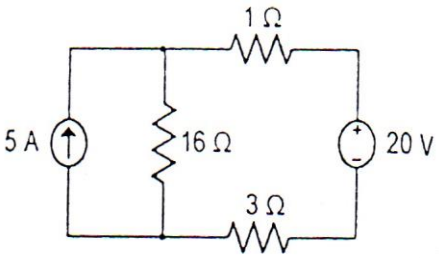

Figure 1

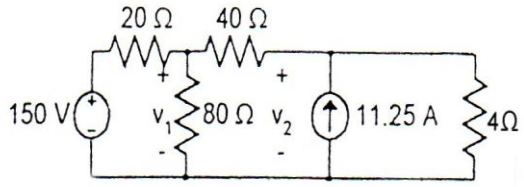

Figure 2

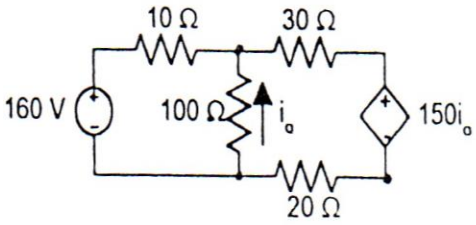

Figure 3

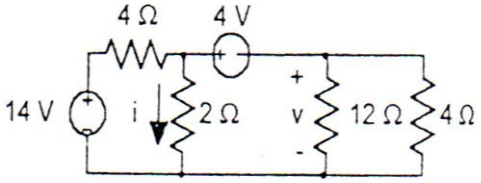

Figure 4

Q5. Using mesh analysis finds mesh currents in Figure 3 and 4.

Q6. Use Mesh analysis to find the power dissipated in the 1Ω resistor. (Ans: 36W)

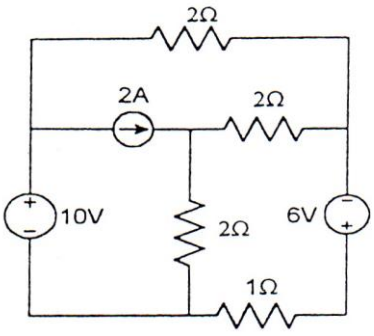

Figure 6

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TUTORIAL 3, 4 (CIRCUIT THEOREMS)

UES 013 ELECTRICAL AND ELECTRONICS ENGINERING

FIRST YEAR (CSE) **Course Instructor: Dr. Shakti Singh**

Superposition

1. Using Superposition theorem (figure 1) , find the current I in 16ohm. (2A)

2. Using Superposition (Figure 2), find the voltage, V. (32 V)

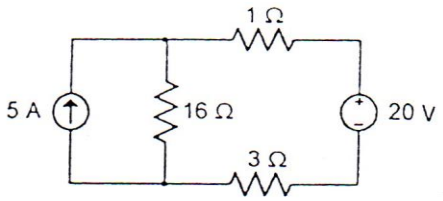

Figure 1

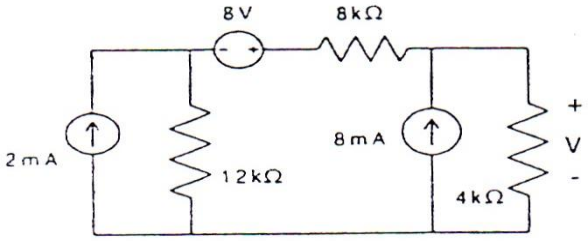

Figure 2

Thevenin Theorem

3.Find the Thevenin equivalent circuit with respect to terminal ab for figure 3. (60 V, 10 Ω)

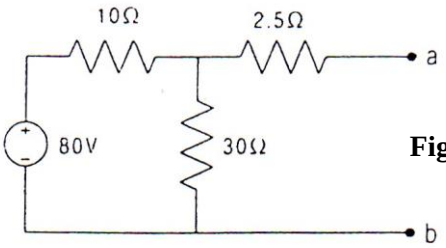

Figure 3

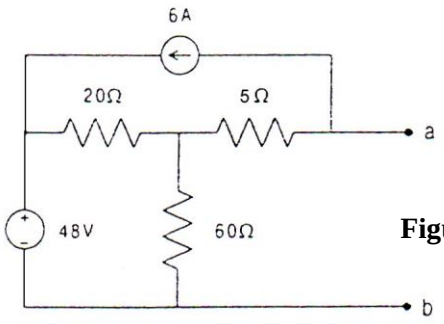

Figure 4

4.Find the Thevenin equivalent circuit with respect terminal ab for figure 4. (-84 V, 20 Ω)

5.Find the Thevenin equivalent circuit with respect to terminal ab for figure 5. (30 V, 20 Ω)

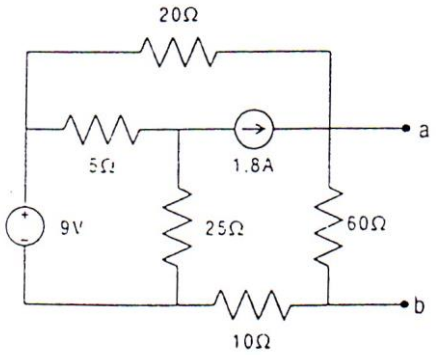

Figure 5

Norton Theorem

6. Find the Norton equivalent circuit with respect to terminals ab for figure 6 . (- 4 mA, 4 kΩ)

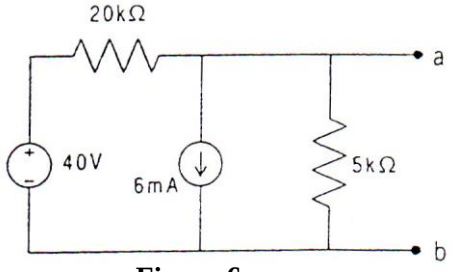

Figure 6

7. Find the Norton equivalent circuit with respect to terminals ab for figure 7. (1.67 A, 2.4 Ω)

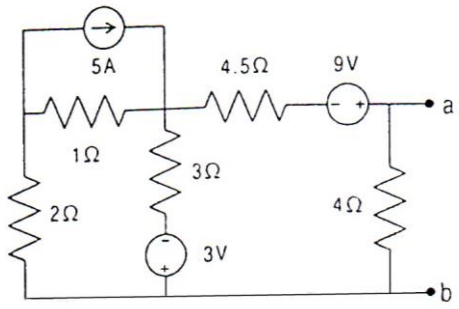

Figure 7

Source-Transformation (Thevenin & Norton)

8. Find the Thevenin and Norton equivalent for the network shown below.
((i) -22.65V, - 15.95A, 1.42 Ω (ii) 73 V, 6.64A, 11 Ω)

(i)

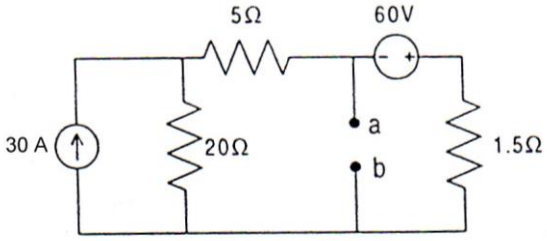

Figure8(i)

(ii)

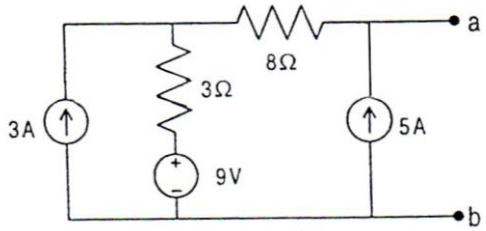

Figure 8(ii)

Maximum Power Transfer

9. The load resistance in figure below is adjusted until maximum power is delivered. Find the power delivered and the value of R_L.
((i) 600 Ω, 38.4 mW (ii) 21.7 Ω, 0.8 W)
(i) (ii)

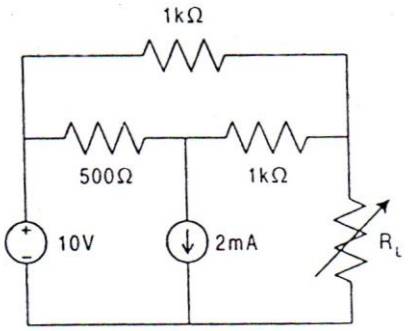

Figure9(i)

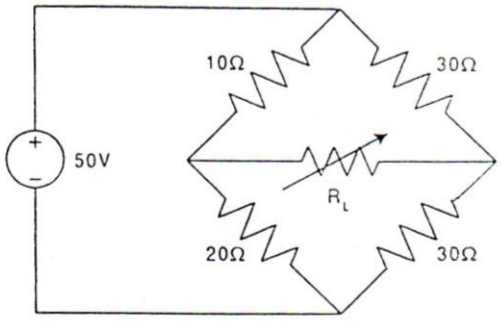

Figure 9(ii)

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DEPARTMENT OF ELECTRICAL AND INSTRUMENATION ENGINEERING

TUTORIAL 5 (THEOREMS)

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1. Calculate the effective resistance between points A and B as given in Fig. 1. **[Ans. 3.69 Ω]**
2. In the circuit shown in Fig. 2, calculate current through 1 Ω resistance connected between A-B, using Thevenin's theorem. Verify your answer using superposition theorem. **[Ans. 14 A]**
3. For the circuit shown in Fig. 3, find the voltage across 4 Ω resistance by source transformation. **[Ans. 7.112 V]**
4. Using superposition theorem, find the value of output voltage $\mathbf{V_0}$ in the circuit of Fig. 4. **[Ans. 2 V]**
5. Determine the Thevenin's equivalent circuit as viewed from the open-circuit terminals ***a*** and ***b*** of the network shown in Fig. 5. All resistances are in ohms. **[Ans. V_{oc} = 3 V, R_{TH} = 5 Ω]**
6. Find $\mathbf{i_0}$ in the circuit of Fig. 6 using superposition theorem. **[Ans. i_0 = -0.4706 A]**

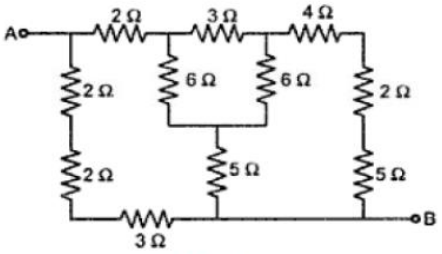

Fig. 1

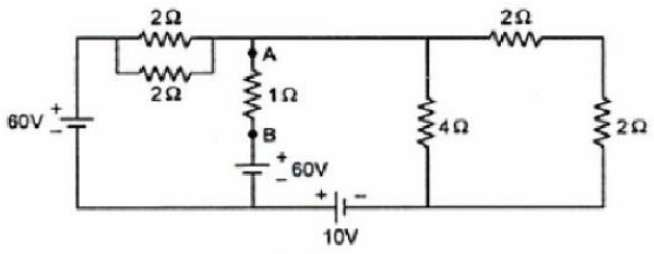

Fig. 2

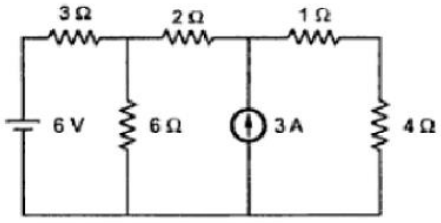

Fig. 3

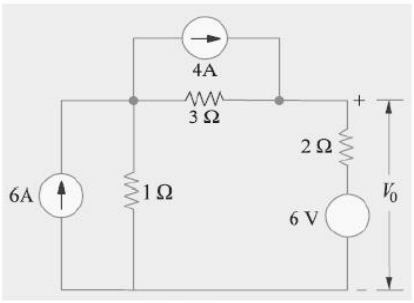

Fig. 4

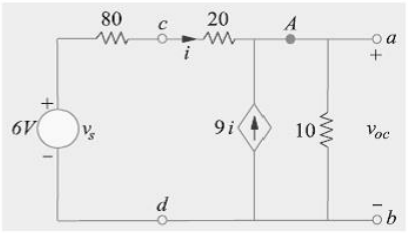

Fig. 5

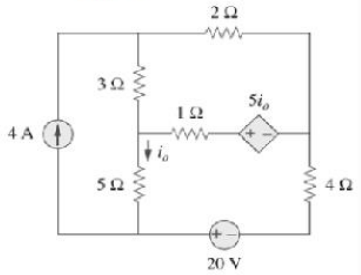

Fig. 6