Tutorial-1

1. State Kirchhoff's law. Find the current in 3 Ω resistance in fig.1 by loop current method and verify the answer by node voltage method.

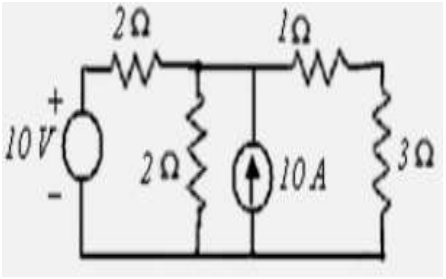

Fig. 1

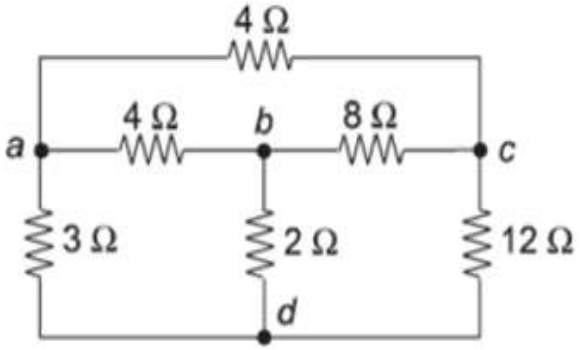

Fig. 2

2. Reduce the network of fig. 2 to obtain the equivalent resistance as seen between nodes a and d.

3. Find current I in the circuit shown in fig. 3. All resistances are in ohms.

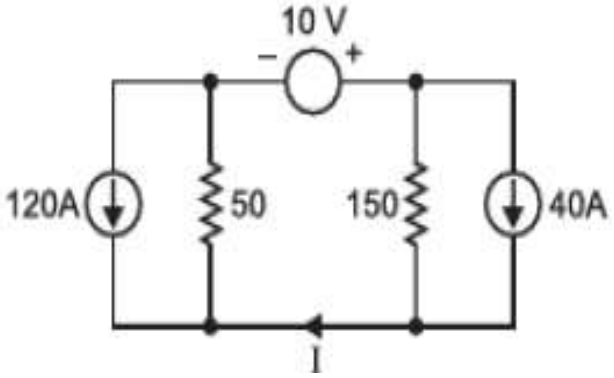

Fig. 3

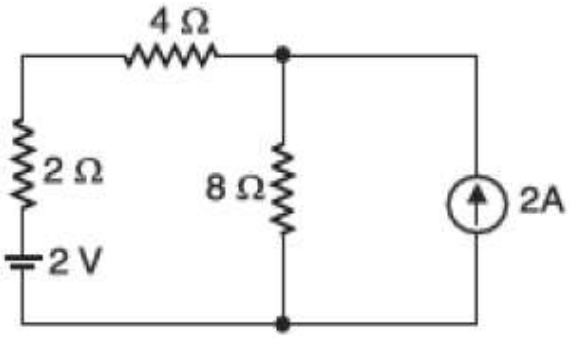

Fig. 4

4. Use nodal analysis to find the voltage across and current through 4 Ω resistor in fig. 4.

5. Find the current and voltage across 2 Ω resistance in the following fig. 5.

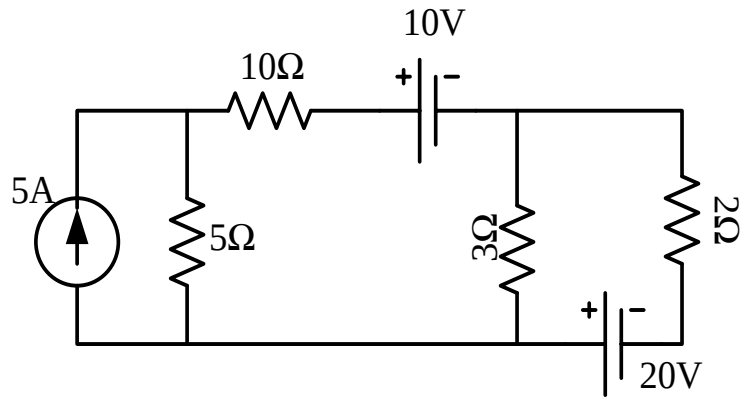

Fig. 5

(Ans: 5A, 10V)

6. Use nodal analysis to find the currents in 3 Ω and 4 Ω resistors of the circuit shown in fig. 6.

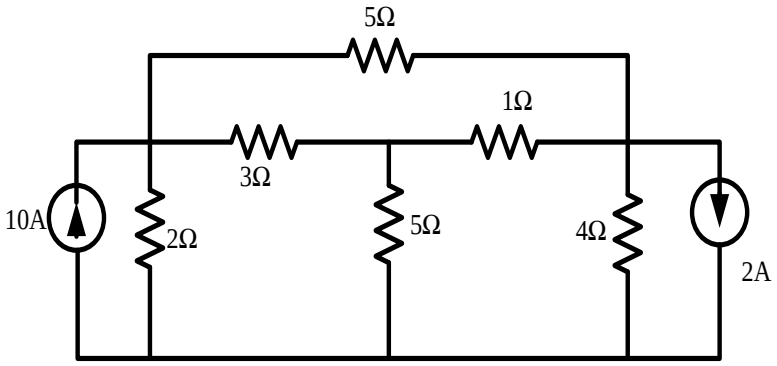

Fig. 6

(Ans: $I_2 = 2.3A \;\; I_4 = 1.29A$**)**

7. Using delta to Star Transformation determines the resistance between terminals a-b and the total power drawn from the supply in the circuit shown in fig.7.

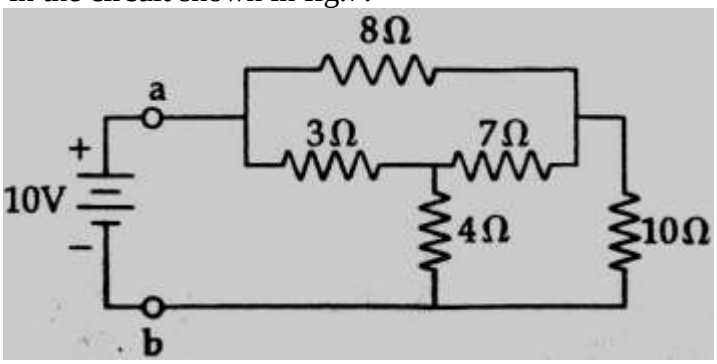

Fig. 7

(Ans: $R_{eq} = 5.031\ \Omega,\ P = 19.873\,\mathbf{W}$**)**

8. Find I_1, I_2 and I_3 in the network shown in fig. 8 below using loop current method.

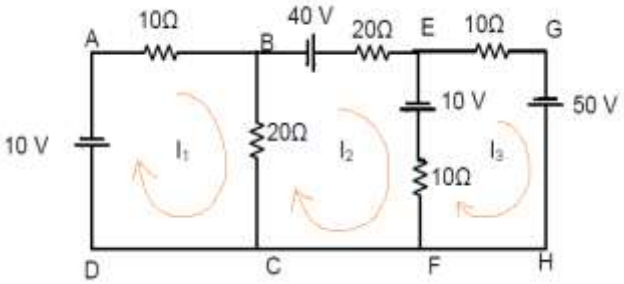

Fig. 8

(Ans: $I_1 = 1A, I_2 = 2A, I_3 = 3A$***)***

9. Use nodal analysis to find currents in the different branches of the circuit shown in fig. 9.

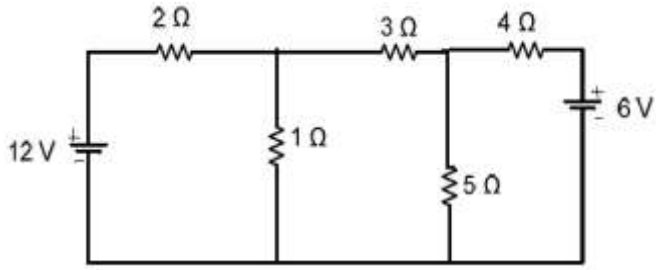

Fig. 9

(Ans: $I_{R2} = 4.038A, I_{R1} = 3.924A, I_{R3} = 0.1133A, I_{R5} = 0.7168A, I_{R4} = 0.604A$***)***

10. For the circuit shown in fig. 10,

i.Calculate V_{out} , ignoring the internal resistance R_s of the source E. Use voltage division.

ii.Recalculate V_{out} taking into account the internal resistance R_s of the source. What percent error was introduced by ignoring R_s in part (i)?

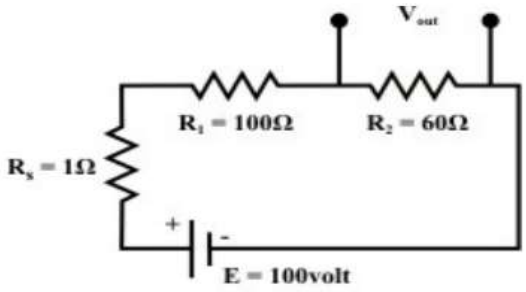

Fig. 10

(Ans: (i) V_{out}***= 37.9V,*** (ii) V_{out}***= 37.27V, Error = 1.69%)***

11. Determine $I_1, I_2, I_3, and\ I_5$ using only current divider formula in fig. 11, when $I_4 = 4A$.

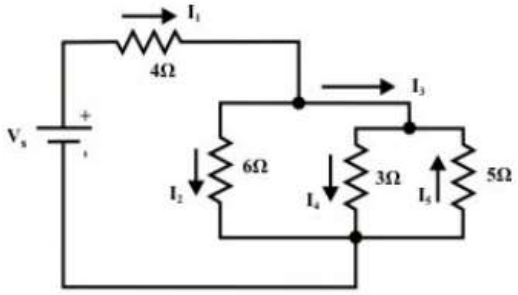

Fig. 11

$(I_1 = 3.4\,A,\ I_2 = 2.004A\ I_3 = 3.4A, I_5 = 2.4A)$

12. Consider the nonseries-parallel circuit shown in fig. 12. Determine R and the equivalent resistance R_{eq} between the terminals "a" & "b" when $V_1 = 8V$. (Hint: Applying basic two Kirchhoff's laws).

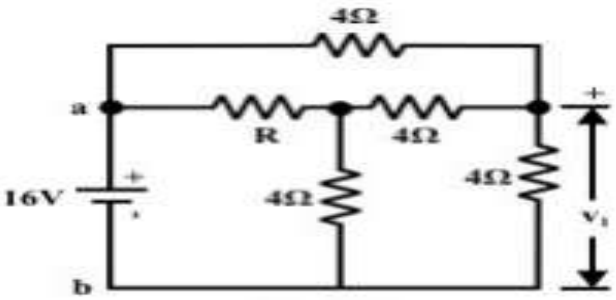

Fig. 12

(*Ans: R = 4 Ω,* $R_{eq} = 4\ \Omega$**.)**

13. Find equivalent resistance between the terminals 'a' & 'b' and assume all resistors values are 1Ω fig. 13.

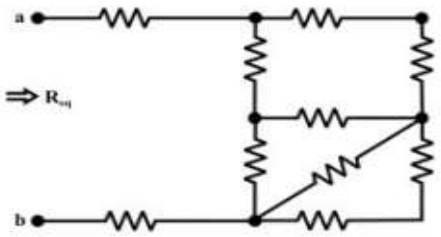

Fig. 13

14. Find the current through 'ab-branch' ($\boldsymbol{I_{ab}}$) and voltage ($\boldsymbol{V_{cg}}$) across the current source using Mesh-current method in Fig. 14.

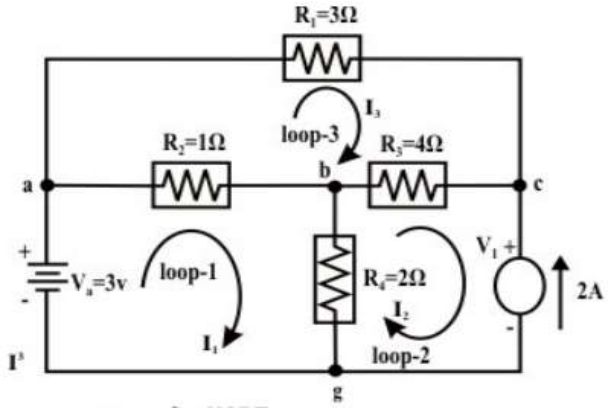

Fig. 14

($\boldsymbol{Ans: I_{ab} = 0.39A, V_{cg} = 6.27V}$)

15. For the circuit shown Fig. 15, find $\boldsymbol{V_x}$ using the mesh current method.

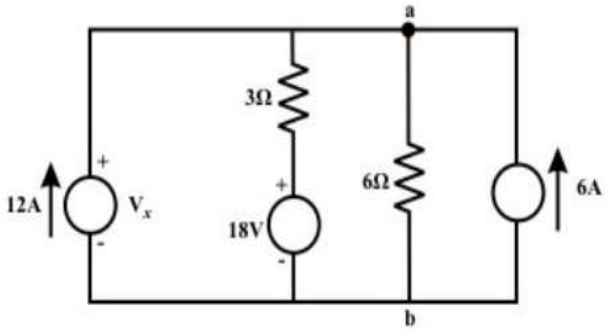

Fig. 15

($\boldsymbol{Ans: V_x = 48\ V}$)

16. Find the value of the current I flowing through the battery in fig.16 using 'Node voltage' method.

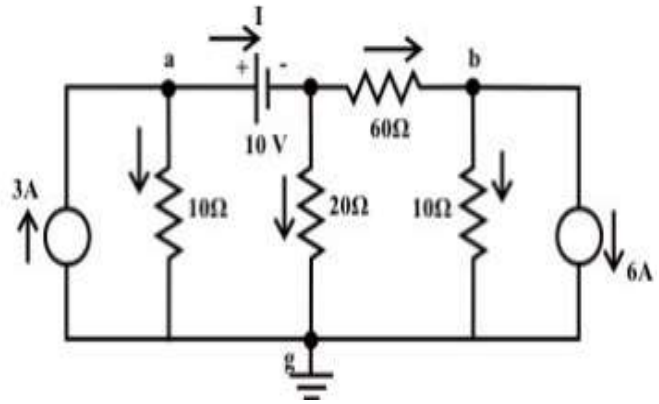

Fig. 16

($\boldsymbol{Ans: I = 1.307A}$)

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