Navlakhi's

Chapter 1

AC – DC Networks

[Classwork Suppliment]

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• PROBLEMS •

Mesh analysis :

1. Find currents I_x and I_y.

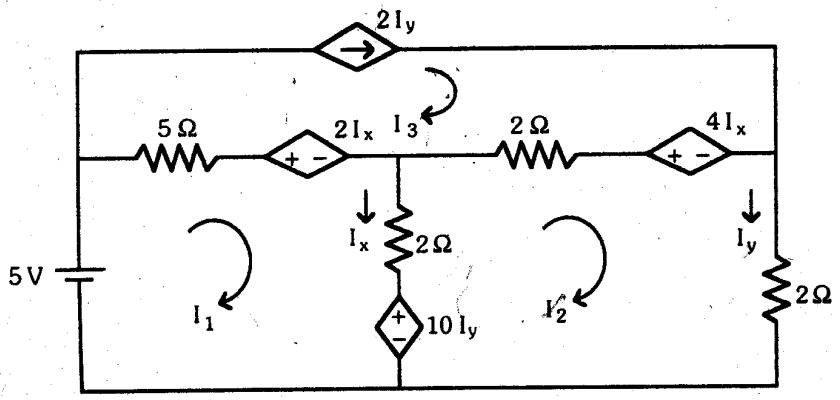


Fig.

(0.5 A, 0.1 A)

2. Use mesh analysis to find V_3 if element A is

(a) Short circuit

(b) a 5 Ω resistor

(c) 20 V independent voltage source, positive reference on the right.

(d) a dependent voltage source of 1.5 i_1 with positive reference on the right.

(e) a dependent current source 5 i_1 arrow directed to the right.

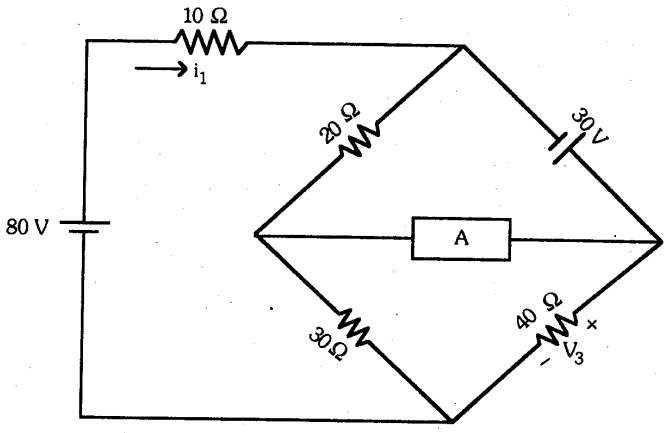


Fig.

(69.4 V, 72.38 V , 73.68 V, 70.71 V, 97.39 V)

3. Find I_1 if the dependent voltage is labelled (i) 2 V_2 (ii) 1.5 V_3.

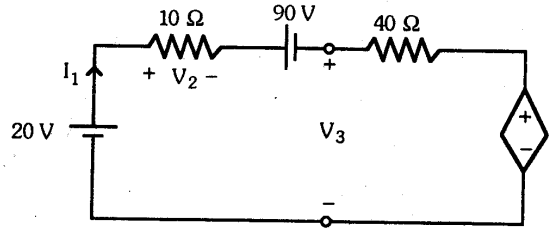


Fig.

(−1 A, 1 A)

4. Find currents I_1, I_2 and I_3.

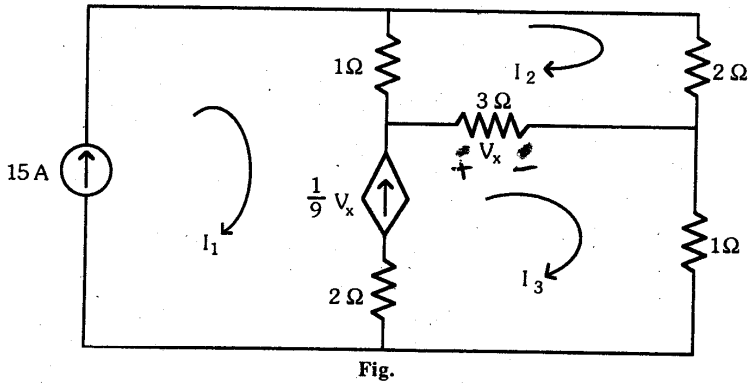


Fig.

(15 A, 11 A, 17 A)

5. Find current I_x.

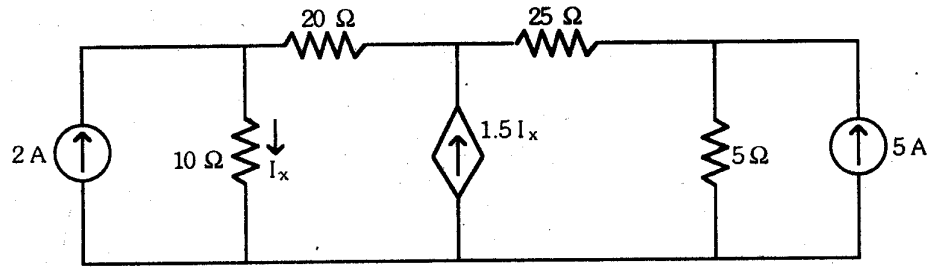


Fig.

(8.33 A)

6. Find current I_1.

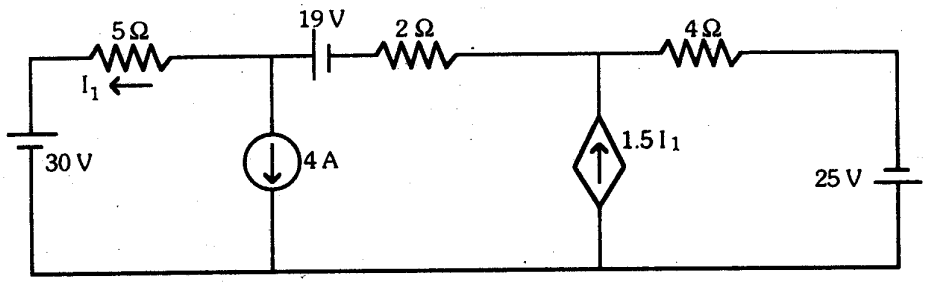


Fig.

(−12 A)

7. Find the current through 3 + j4 Ω impedance.

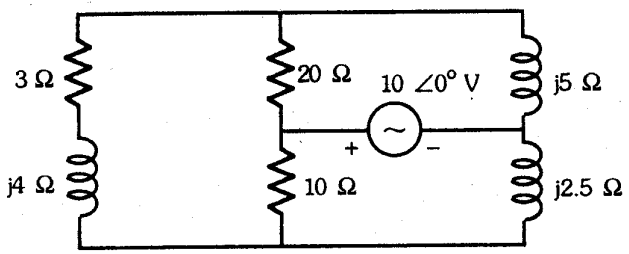


Fig.

[0]

8. In the network of Fig. find V_0.

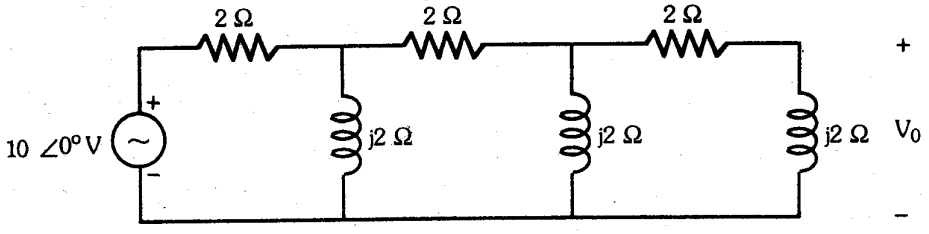


Fig.

[1.56 ∠128.7° V]

9. Find the current I_3 in the network of Fig.

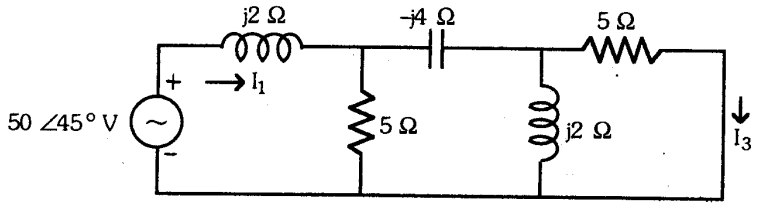


Fig.

[11.6 ∠113.2° A]

10. In the network of Fig. find V_2 which results in zero current through 4 Ω resistor.

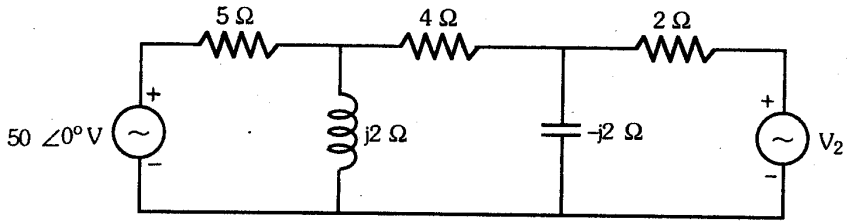


Fig.

[26.3 ∠113.2° V]

Nodal analysis :

11. Find voltage V_x.

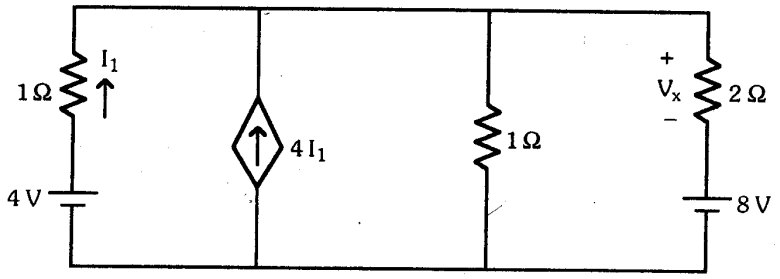


Fig.

(−4.31 V)

12. Find voltage V_x.

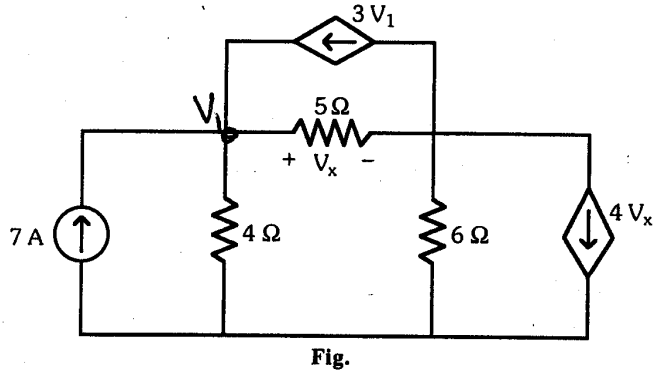


Fig.

(2.09 V)

13. Find voltage V_x.

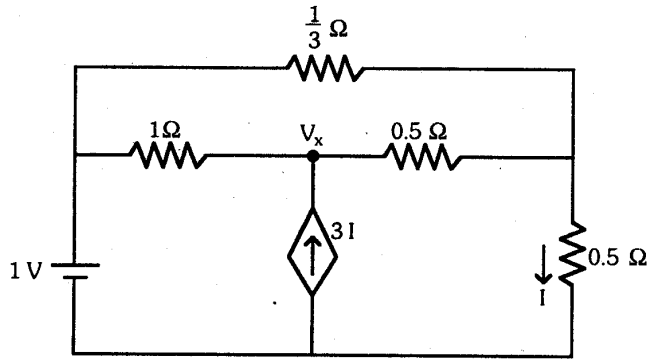


Fig.

(6.2 V)

14. Determine V_1.

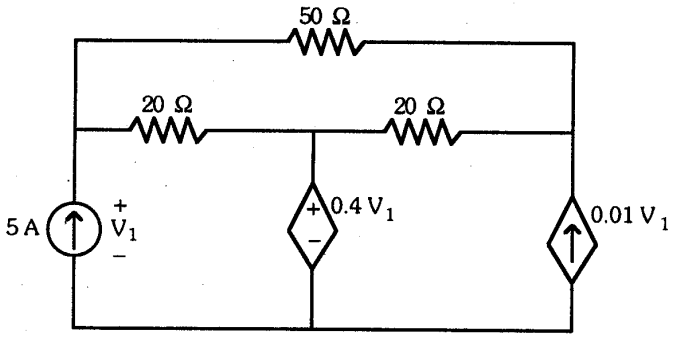


Fig.

(140 V)

15. Find voltage V_y.

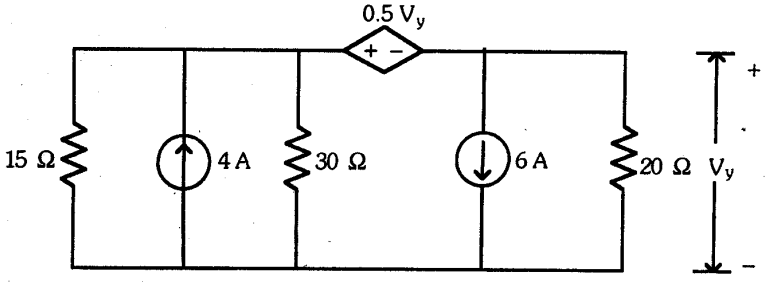


Fig.

(−10 V)

16. Find voltage V_2.

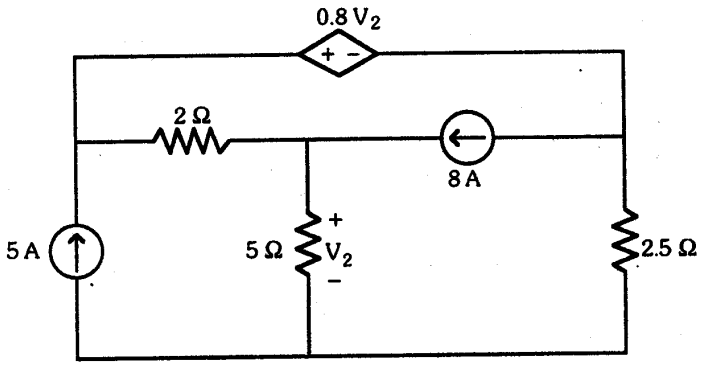


Fig.

(25.9 V)

17. For the network shown in Fig., find the voltage V_{AB}.

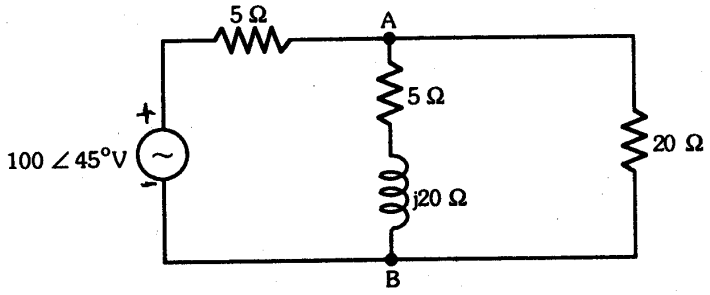


Fig.

[75.4 ∠55.2° V]

18. Find the voltages at nodes 1 and 2 in the network of Fig.

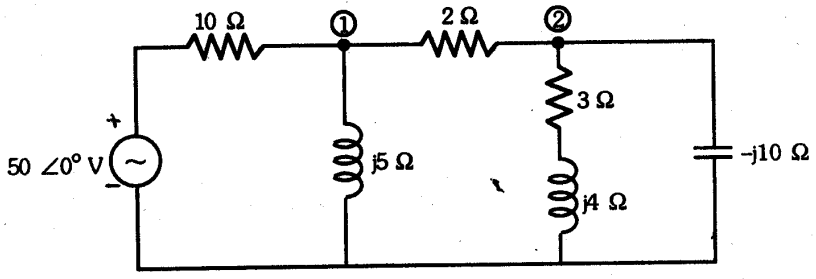


Fig.

[15.95 ∠49.94° V, 12.9 ∠55.5° V]

19. In the network of Fig. find current in the $10 \angle 30^\circ$ V source.

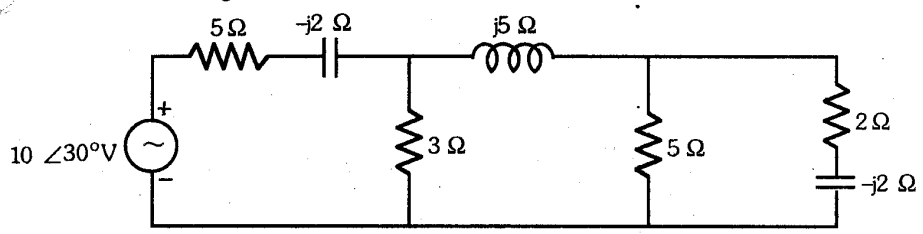


Fig.

[1.44 $\angle 38.8^\circ$ A]

Superposition theorem :

20. Find voltage V_x.

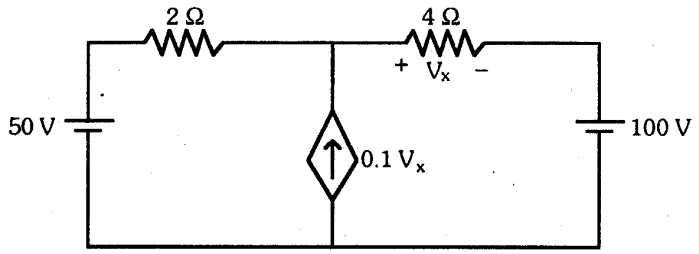


Fig.

(−38.5 V)

21. Determine voltages V_1 and V_2.

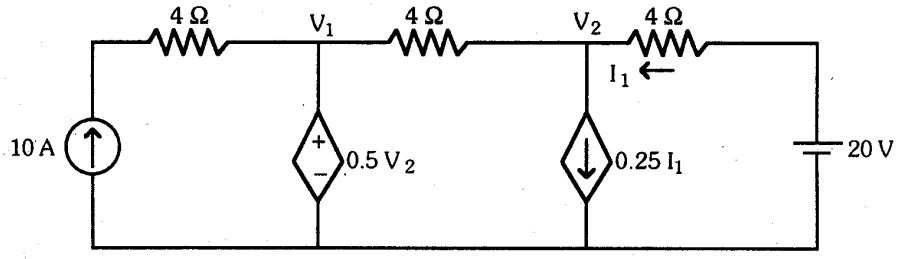


Fig.

(6 V, 12 V)

22. Find voltage V_x.

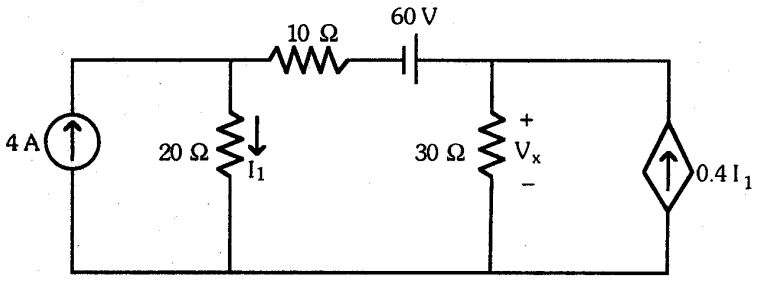


Fig.

(82.5 V)

23. For the network shown, find the current 10 Ω resistor.

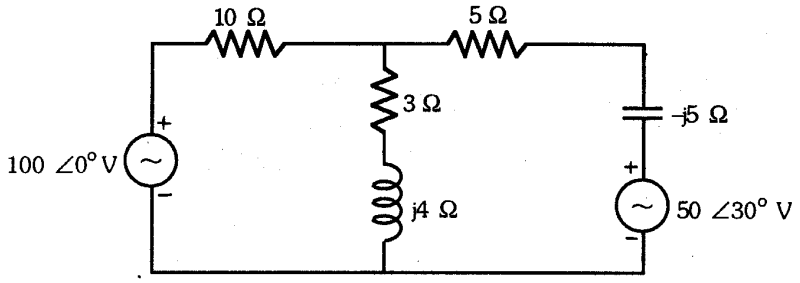


Fig.

[7.84 ∠−21.84° A]

24. In the network of Fig. find current through capacitance.

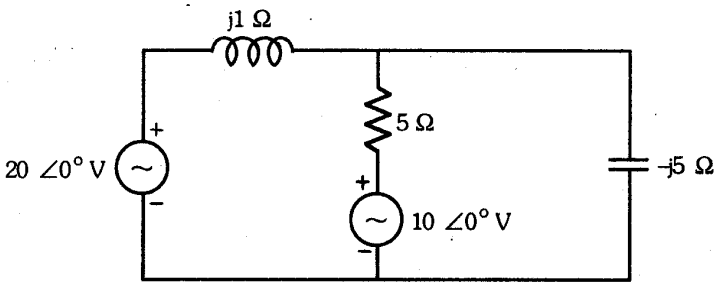


Fig.

[4.86 ∠80.8° A]

Thevenin's and Norton's theorem :

25. Determine Thevenin's equivalent network for the Fig. shown.

(a)

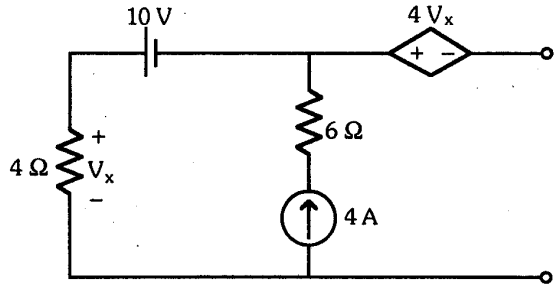


Fig.

(58 V, 12 Ω)

(b)

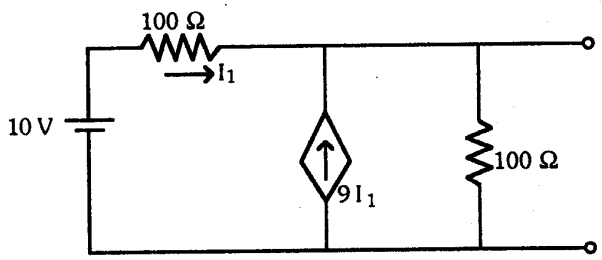


Fig.

(9.09 V, 9.09 Ω)

(c)

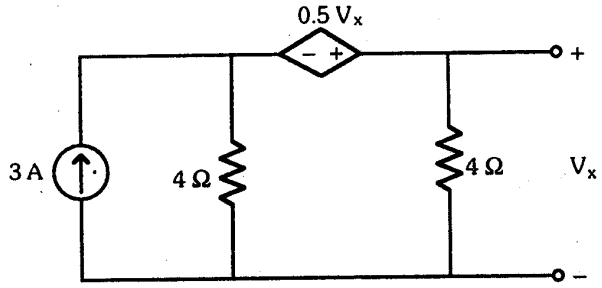


Fig.

(8 V, 2.66 Ω)

(d)

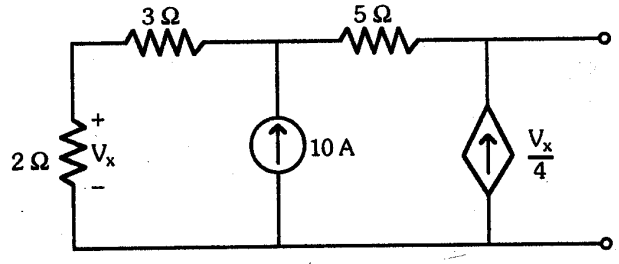


Fig.

(150 V, 20 Ω)

(e)

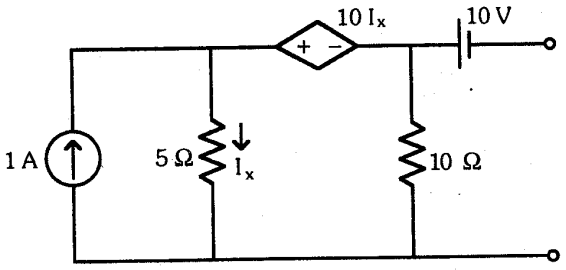


Fig.

(−20 V, −10 Ω)

(f)

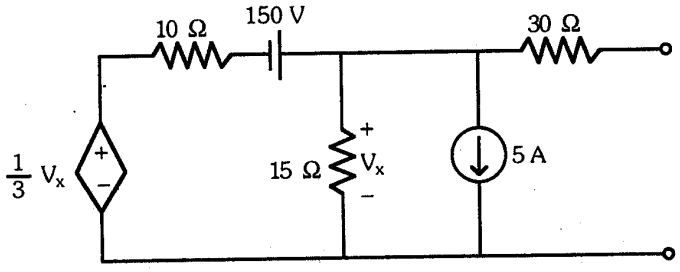


Fig.

(75 V, 37.5 Ω)

(g) *Find V_{Th} and R_{Th} between the point A and B in Fig.*

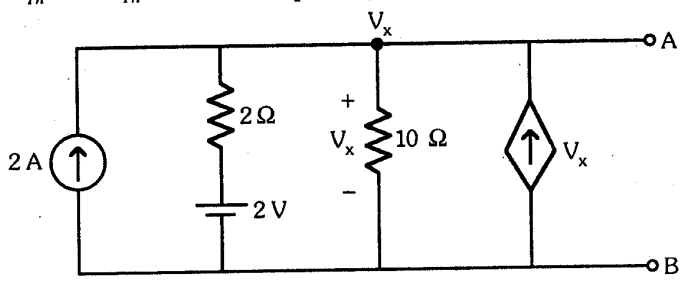


Fig.

26. Find Norton's equivalent network and hence find current in 10 Ω resistor.

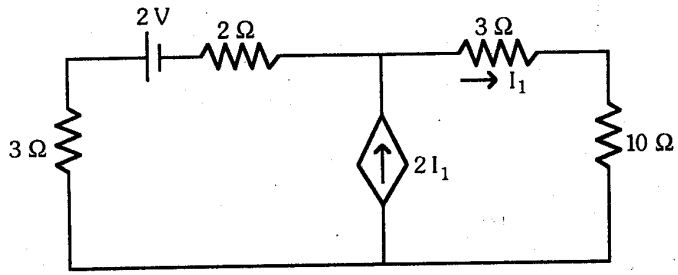


Fig.

(0.25 A)

27. Find current I_x.

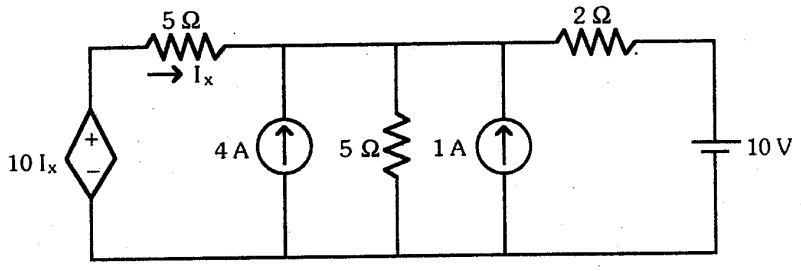


Fig.

(4 A)

28. Find power delivered to 10 Ω resistor.

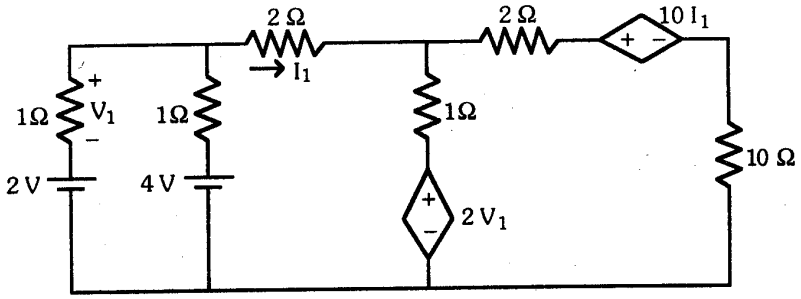


Fig.

(0.138 W)

29. Find current in 24 Ω resistor.

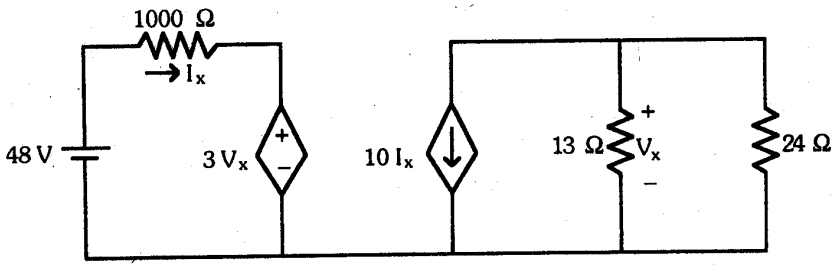


Fig.

(0.225 A)

30. Find Norton's equivalent network.

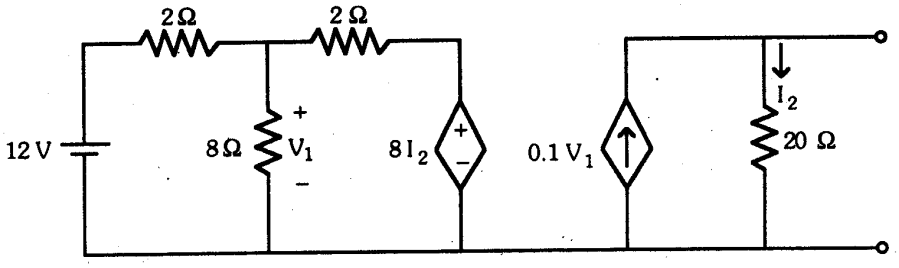


Fig.

(0.533 A, 31 Ω)

31. Obtain Thevenin's equivalent network.

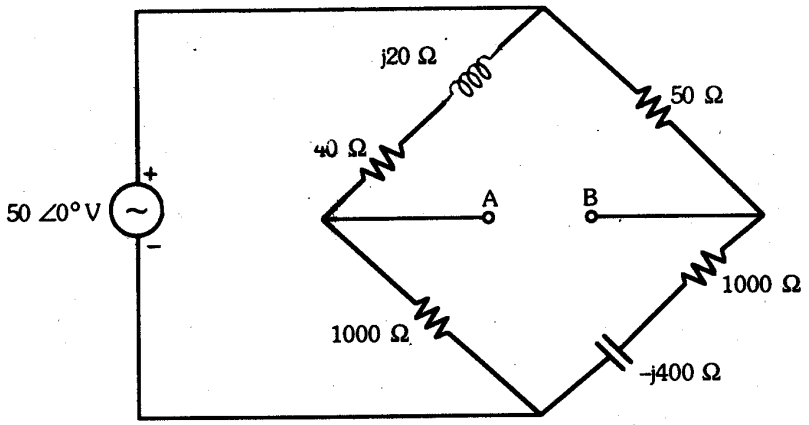


Fig.

[0.192 ∠−43.4° V, 88.7 ∠11.55° Ω]

32. Obtain Thevenin's equation network for the Fig. shown.

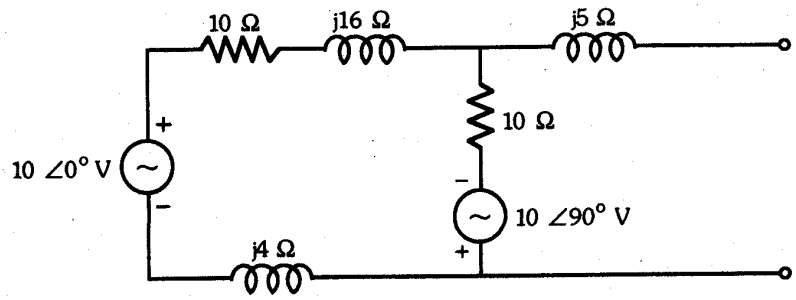
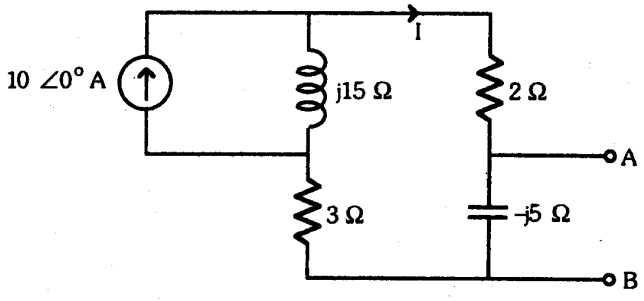


Fig.

[11.17 ∠−63.4° V, 10.6 ∠45° Ω]

33. *Obtain Thevenin's equivalent network for the Fig. shown.*



34. *Obtain Thevenin's equivalent network for the Fig. shown.*

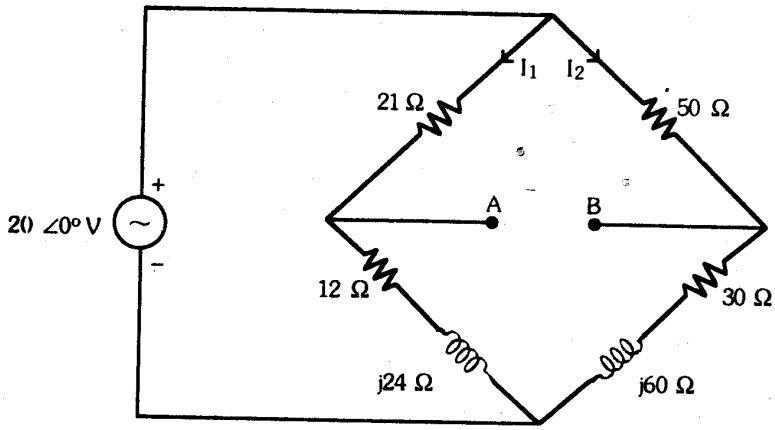


Fig.

35. Determine the maximum power delivered to the load in the network shown in Fig.

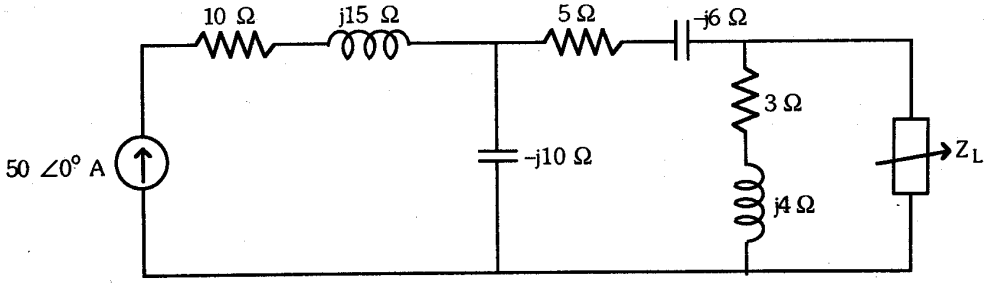


Fig.

[1032.35 W]

36. For the network shown, find the value of Z_L that will receive the maximum power. Determine also this power.

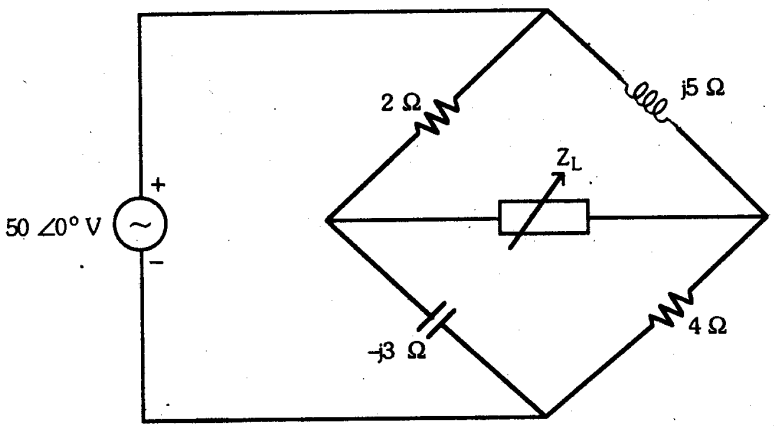


Fig.

[3.82 − j1.03 Ω, 54.5 W]

37. Calculate the power dissipated across 10 Ω resistor by using source transformation technique.

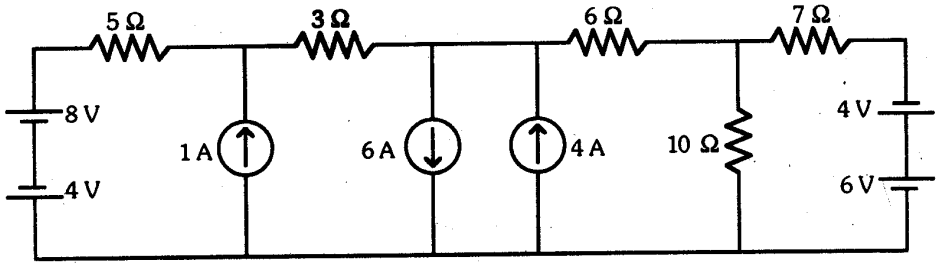


Fig.

(0.046 W)

38. Determine voltage V_x by source shifting technique.

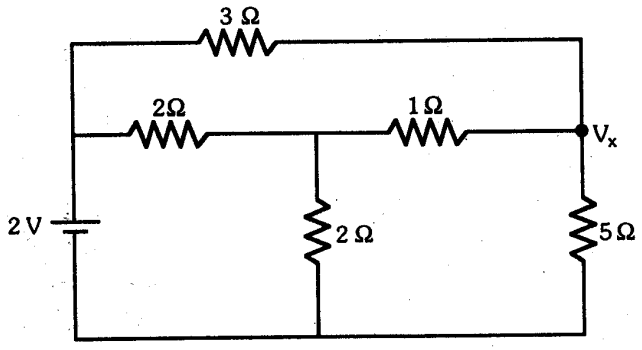


Fig.

$\left(\frac{35}{31}\text{ V}\right)$

39. Use source transformation to simplify the network until two elements remain to the left of terminals a and b.

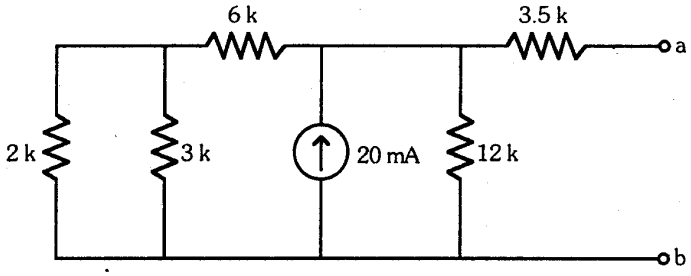


Fig.

(90 V, 8 KΩ)

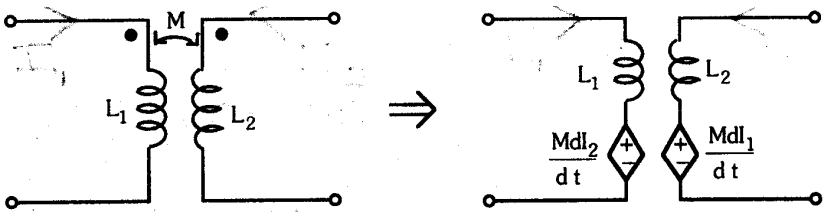
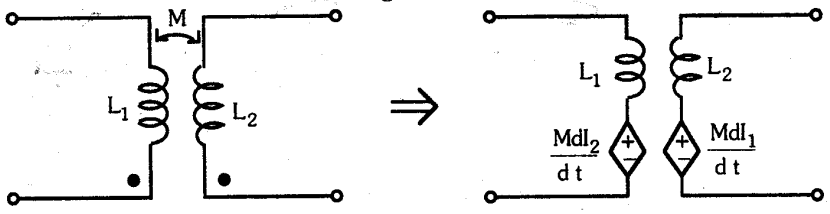


Fig.



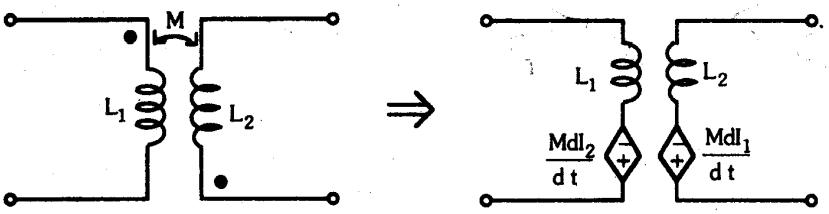


Fig.

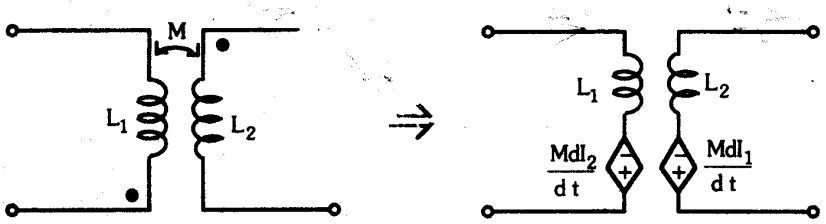
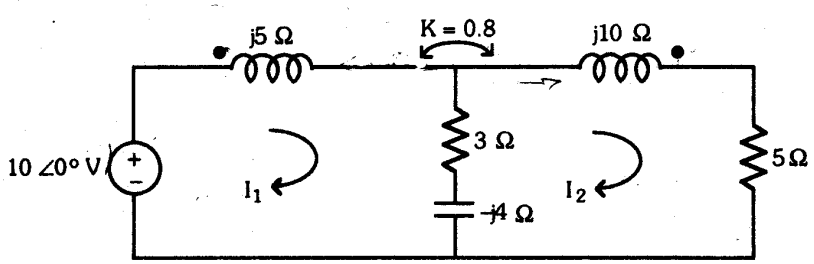
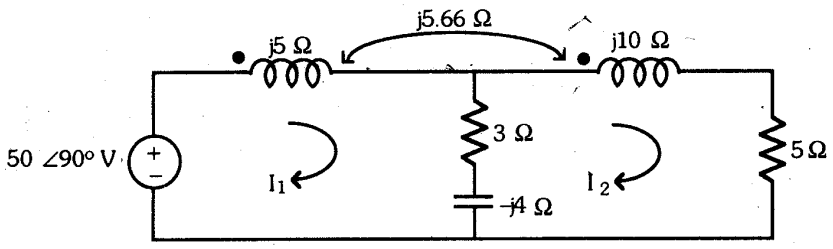


Fig.

40. *Find voltage across 5Ω resistor using mesh analysis.*



41. *Find voltage across 5 Ω resistor using mesh analysis.*



42. *Find current I_2 using mesh analysis.*