

Objective Questions

1. An active element in a circuit is one which

.....

- (i) receives energy
- (ii) supplies energy
- (iii) both receives and supplies energy
- (iv) none of the above.

2. A passive element in a circuit is one which

.....

- (i) supplies energy
- (ii) receives energy
- (iii) both supplies and receives energy
- (iv) none of the above

3. An electric circuit contains

 - (i) active elements only
 - (ii) passive elements only
 - (iii) both active and passive elements
 - (iv) none of the above

4. A linear circuit is one whose parameters (e.g. resistances etc.)

 - (i) change with change in current
 - (ii) change with change in voltage
 - (iii) do not change with voltage and current
 - (iv) none of the above

5. In the circuit shown in Fig. 3.16, the number of nodes is

 - (i) one
 - (ii) two
 - (iii) three
 - (iv) four

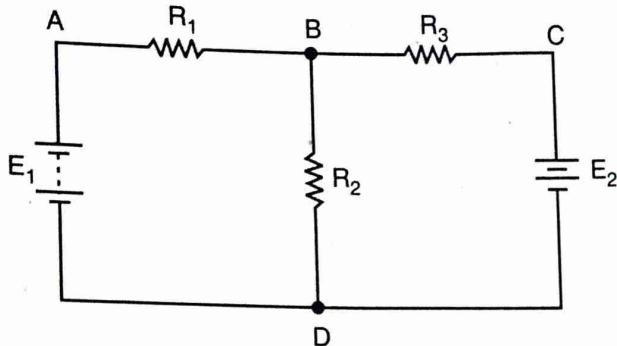


Fig. 3.16

6. In the circuit shown in Fig. 3.16, there are junctions.

 - (i) three
 - (ii) four
 - (iii) two
 - (iv) none of the above

7. The circuit shown in Fig. 3.16, has branches.

 - (i) two
 - (ii) four
 - (iii) three
 - (iv) none of these

8. The circuit shown in Fig. 3.16 has loops.

 - (i) two
 - (ii) four
 - (iii) three
 - (iv) none of the above

9. In the circuit shown in Fig. 3.16, there are meshes.

 - (i) two
 - (ii) three
 - (iii) four
 - (iv) five

10. To solve the circuit shown in Fig. 3.17 by Kirchhoff's laws, we require

 - (i) one equation
 - (ii) two equations
 - (iii) three equations
 - (iv) none of the above

11. To solve the circuit shown in Fig. 3.17 by nodal analysis, we require

 - (i) one equation
 - (ii) two equations
 - (iii) three equations
 - (iv) none of the above

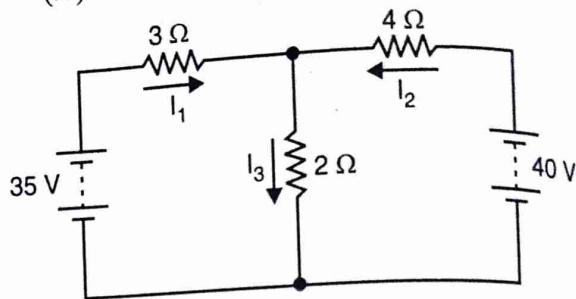


Fig. 3.17

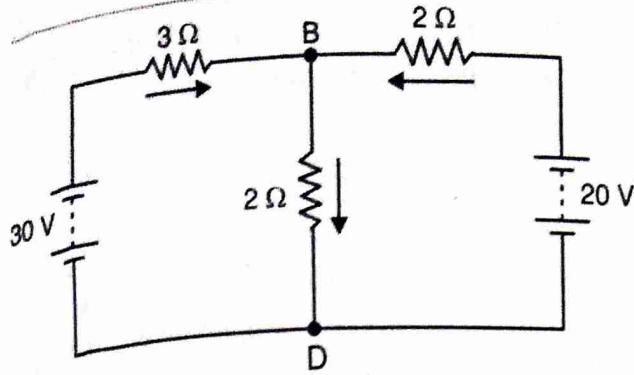


Fig. 3.18

16. In order to solve the circuit shown in Fig. 3.18 by nodal analysis, we require

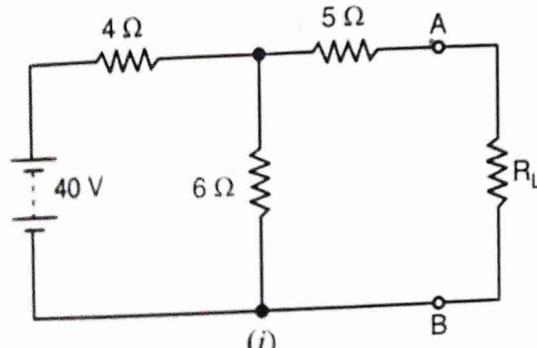
- (i) one equation
- (ii) two equations
- (iii) three equations
- (iv) none of the above

17. The superposition theorem is used when the circuit contains

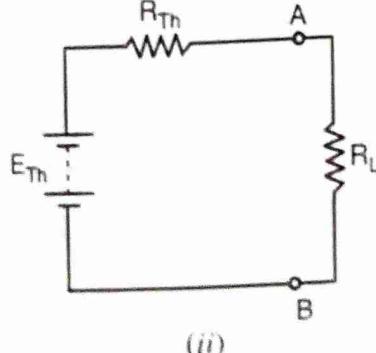
- (i) a single voltage source
- (ii) a number of voltage sources
- (iii) passive elements only
- (iv) none of the above

18. Fig. 3.19 (ii) shows Thevenin's equivalent circuit of Fig. 3.19 (i). The value of Thevenin's voltage E_{Th} is

- (i) 20 V
- (ii) 24 V
- (iii) 12 V
- (iv) 36 V



(i)



(ii)

Fig. 3.19

19. The value of R_{Th} in Fig. 3.19 (ii) is

- | | |
|-------------|------------|
| (i) 15 Ω | (ii) 3.5 Ω |
| (iii) 6.4 Ω | (iv) 7.4 Ω |

20. The open-circuited voltage at terminals AB in Fig. 3.19 (i) is

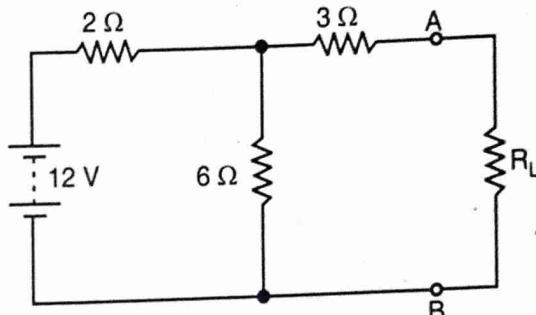
- | | |
|------------|-----------|
| (i) 12 V | (ii) 20 V |
| (iii) 24 V | (iv) 40 V |

21. For transfer of maximum power in the circuit shown in Fig. 3.19 (i), the value of R_L should be

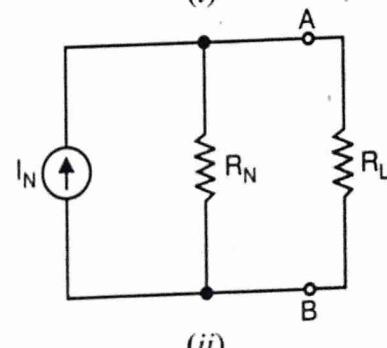
- | | |
|-------------|------------|
| (i) 3.5 Ω | (ii) 6.4 Ω |
| (iii) 7.4 Ω | (iv) 15 Ω |

22. Fig. 3.20 (ii) shows Norton's equivalent circuit of Fig. 3.20 (i). The value of R_N is

- | |
|------------------------|
| (i) 5 Ω |
| (ii) 4.5 Ω |
| (iii) 10.5 Ω |
| (iv) none of the above |



(i)



(ii)

Fig. 3.20

23. The value of I_N in Fig. 3.20 (ii) is

- | |
|------------------------|
| (i) 3 A |
| (ii) 1 A |
| (iii) 2 A |
| (iv) none of the above |

24. Thevenin's theorem is form of an equivalent circuit.

- (i) voltage
- (ii) current
- (iii) both voltage and current
- (iv) none of the above

25. Norton's theorem is Thevenin's theorem.

- (i) the same as
- (ii) converse of
- (iii) none of the above
- (iv) cannot say

26. In the analysis of a vacuum tube circuit, we generally use theorem.

- (i) superposition
- (ii) Norton's
- (iii) Thevenin's
- (iv) reciprocity

27. Norton's theorem is form of an equivalent circuit.

- (i) both voltage and current
- (ii) current
- (iii) voltage
- (iv) none of the above

28. In the analysis of a transistor circuit, we usually use theorem.

- (i) Norton's
- (ii) Thevenin's
- (iii) reciprocity
- (iv) superposition

29. Fig. 3.21 (i) shows Norton's equivalent circuit of a network whereas Fig. 3.21 (ii) shows its Thevenin's equivalent circuit. The value of E_{Th} is

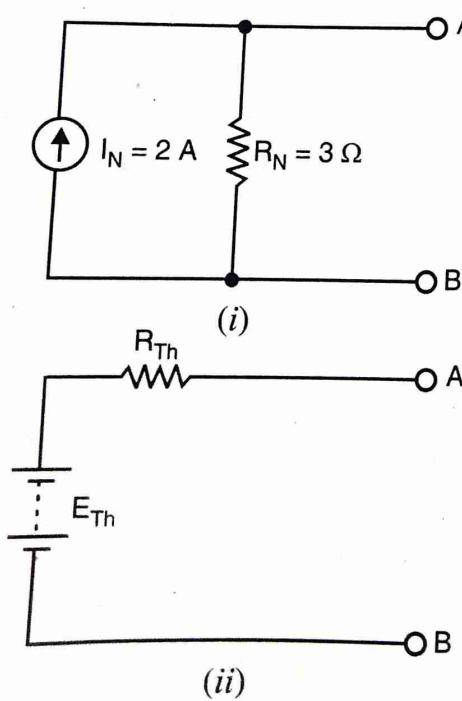


Fig. 3.21

- (i) 1.5 V
- (ii) 0.866 V
- (iii) 3 V
- (iv) 6 V

30. The value of R_{Th} in Fig. 3.21 (ii) is

- (i) 3 Ω
- (ii) 2 Ω
- (iii) 1.5 Ω
- (iv) 6 Ω

31. If in Fig. 3.21 (i), the value of I_N is 3 A, then value of E_{Th} in Fig. 3.21 (ii) will be

- (i) 1 V
- (ii) 9 V
- (iii) 5 V
- (iv) none of the above

32. For transfer of maximum power, the relation between load resistance R_L and internal resistance R_i of the voltage source is

- (i) $R_L = 2 R_i$
- (ii) $R_L = 0.5 R_i$
- (iii) $R_L = 1.5 R_i$
- (iv) $R_L = R_i$

33. Under the condition of maximum power transfer, the efficiency is

- (i) 75%
- (ii) 100%
- (iii) 50%
- (iv) 25%

34. The open-circuited voltage at the terminals of load R_L is 30 V. Under the condition of maximum power transfer, the load voltage will be

- (i) 30 V
- (ii) 10 V
- (iii) 5 V
- (iv) 15 V

35. The maximum power transfer theorem is used in

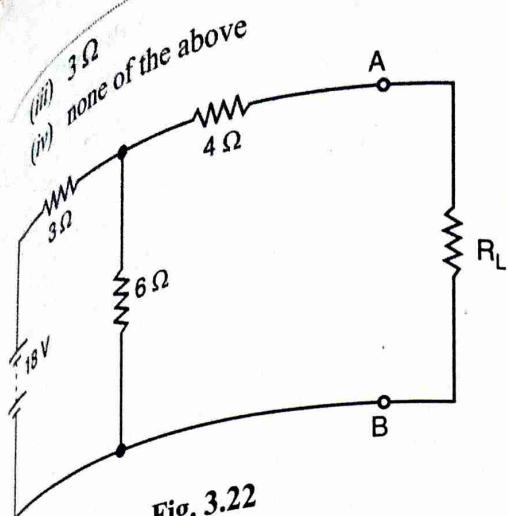
- (i) electronic circuits
- (ii) power system
- (iii) home lighting circuits
- (iv) none of the above

36. Under the condition of maximum power transfer, a voltage source is delivering a power of 30 W to the load. The power generated by the source is

- (i) 45 W
- (ii) 30 W
- (iii) 60 W
- (iv) 90 W

37. For the circuit shown in Fig. 3.22, the power transferred will be maximum when R_L is equal to

- (i) 4.5 Ω
- (ii) 6 Ω



38. The open-circuited voltage at terminals AB in Fig. 3.22 is

- (i) 12 V
- (ii) 6 V
- (iii) 15 V
- (iv) 9.5 V

39. If in Fig. 3.22, the value of $R_L = 6 \Omega$, then current through R_L is

- (i) 2 A
- (ii) 1.5 A
- (iii) 1.75 A
- (iv) 1 A

40. Under the condition of maximum power transfer, the voltage across R_L in Fig. 3.22 is

- (i) 6 V
- (ii) 4 V
- (iii) 9 V
- (iv) 12 V

41. The output resistance of a voltage source is 4Ω . Its internal resistance will be

- (i) 4Ω
- (ii) 2Ω
- (iii) 1Ω
- (iv) infinite

42. Delta/Star or star/delta transformation technique is applied to network.

- (i) one terminal
- (ii) two terminal
- (iii) three terminal
- (iv) none of the above

43. The resistor values in delta network that is equivalent to a wye containing three 120Ω resistors is

- (i) 360Ω each
- (ii) 240Ω each
- (iii) 180Ω each
- (iv) 120Ω each

44. The resistor values in wye network that is equivalent to a delta containing three $12 \text{ k}\Omega$ resistors is

- (i) $2 \text{ k}\Omega$ each
- (ii) $4 \text{ k}\Omega$ each

45. (iii) $8 \text{ k}\Omega$ each (iv) $6 \text{ k}\Omega$ each
- When a load of $1 \text{ k}\Omega$ is connected across a 20 mA current source, it is found that only 18 mA flows in the load. What is the internal resistance of the source?

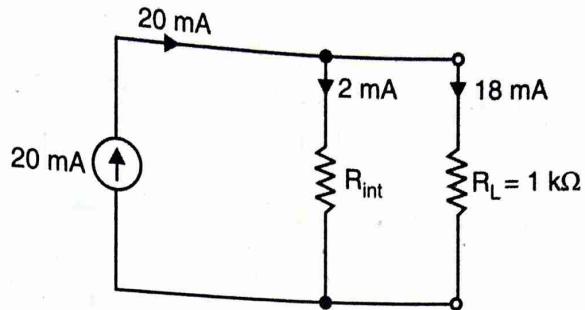


Fig. 3.23

- (i) $3 \text{ k}\Omega$
- (ii) $6 \text{ k}\Omega$
- (iii) $18 \text{ k}\Omega$
- (iv) $9 \text{ k}\Omega$

46. What would be the terminal voltage of the current source (with R_L connected) in Fig. 3.23 if the internal resistance of the source were $1.5 \text{ k}\Omega$?

- (i) 6 V
- (ii) 9 V
- (iii) 12 V
- (iv) 3 V

47. The current in $3 \text{ k}\Omega$ resistor in Fig. 3.24 by converting the current source into voltage source is

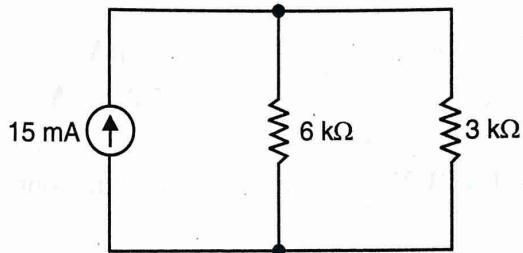


Fig. 3.24

- (i) 10 mA
- (ii) 12 mA
- (iii) 6 mA
- (iv) 5 mA

48. Using mesh analysis, the current in 4Ω resistor in Fig. 3.25 is

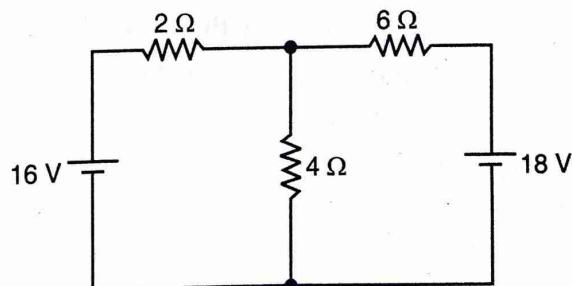


Fig. 3.25

- (i) 3 A downward
- (ii) 6 A upward

49. (iii) 9 A upward (iv) 2 A downward
Using mesh analysis, the current in $6\ \Omega$ resistor in Fig. 3.26 is

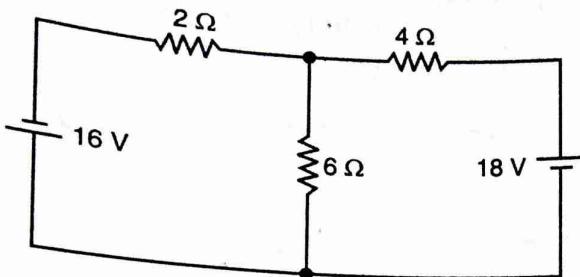


Fig. 3.26

- (i) 0.32 A ↓ (ii) 0.64 A ↑
(iii) 0.32 A ↑ (iv) 0.64 A ↓

50. A voltage source has a terminal voltage of 28 V when its terminals are open-circuited. When a $12\ \Omega$ load is connected across the terminals, the terminal voltage drops to 24 V. What is the internal resistance of the source ?

- (i) $0.5\ \Omega$ (ii) $1\ \Omega$
(iii) $2\ \Omega$ (iv) $2.5\ \Omega$

51. A 16 mA current source has an internal resistance of $10\ k\Omega$. How much current will flow in a $2.5\ k\Omega$ load connected across its terminals ?

- (i) 4.2 mA (ii) 6 mA
(iii) 11.5 mA (iv) 12.8 mA

52. Convert the voltage source shown in Fig. 3.27 to an equivalent current source.

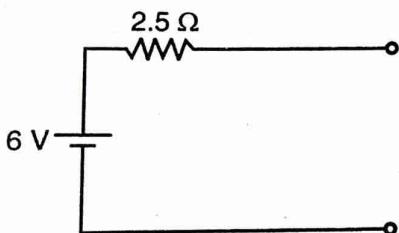


Fig. 3.27

- (i) 2.4 A in parallel with $2.5\ \Omega$ resistor
(ii) 3 A in parallel with $50\ \Omega$ resistor
(iii) 2.4 A in series with $25\ \Omega$ resistor
(iv) none of above.

53. In Fig. 3.27 above, what is the shorted terminal current in the equivalent current source ?

- (i) zero (ii) 4.8 A
(iii) 2.4 A (iv) 1.2 A

54. Convert the current source shown in Fig. 3.28 to equivalent voltage source.

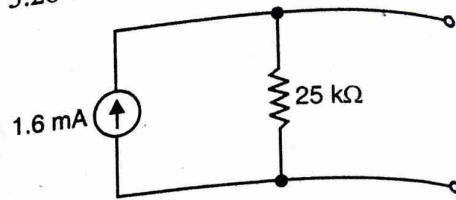


Fig. 3.28

- (i) 20 V in series with $25\ k\Omega$
(ii) 40 V in series with $25\ k\Omega$
(iii) 36 V in parallel with $25\ k\Omega$
(iv) none of the above

55. By performing an appropriate source conversion, find the voltage across $120\ \Omega$ resistor in Fig. 3.29.

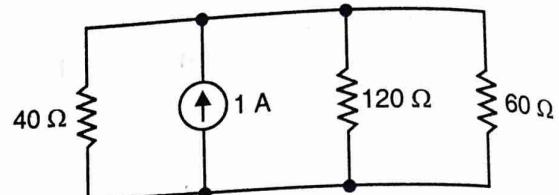


Fig. 3.29

- (i) 40 V (ii) 30 V
(iii) 18 V (iv) 20 V

56. By performing an appropriate source conversion, find the voltage across $120\ \Omega$ resistor in Fig. 3.30.

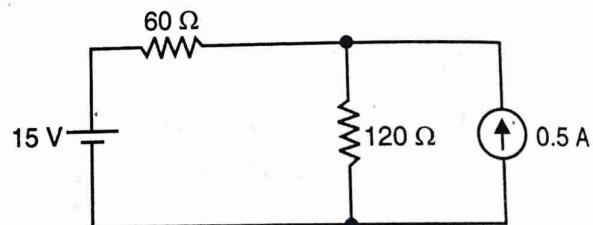


Fig. 3.30

- (i) 20 V (ii) 40 V
(iii) 30 V (iv) 60 V

57. Convert the voltage source in Fig. 3.31 into an equivalent current source.

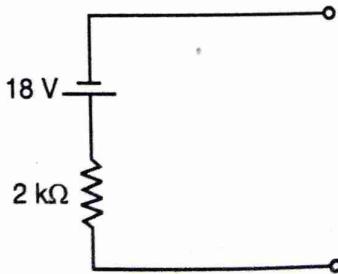


Fig. 3.31

- (i) 4.5 mA in parallel with $2\text{ k}\Omega$
 - (ii) 9 mA in parallel with $2\text{ k}\Omega$
 - (iii) 18 mA in series with $2\text{ k}\Omega$
 - (iv) none of the above

38. In the above question, what is the shorted terminal current in the equivalent current source?

- (i) 4.5 mA (ii) 9 mA
 (iii) 18 mA

Using nodal analysis, what is the voltage at point A [See Fig. 3.32]?

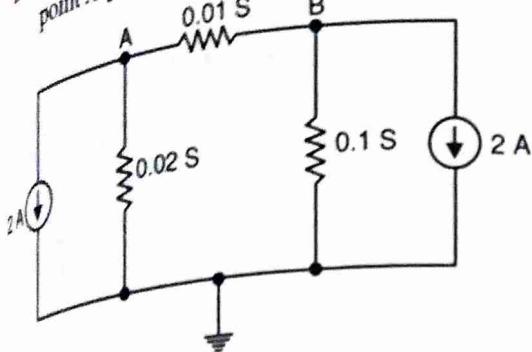


Fig. 3.32

- (i) -75 V (ii) -50 V
 (iii) +25 V (iv) -10 V

60. In Fig. 3.32, what is the potential at point B by nodal analysis?

61. Using superposition theorem, current in $10\ \Omega$ resistor in Fig. 3.33 is

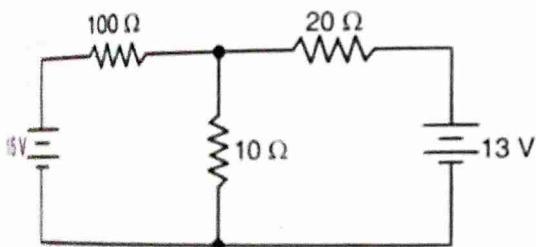


Fig. 3.33

- (i) 200 mA ↓ (ii) about 500 mA ↓
 (iii) 24 mA ↑ (iv) 208 mA ↑

Q. What is the power dissipated in $10\ \Omega$ resistor in Fig. 3.33 above?

10. Find the Thevenin equivalent circuit to the left of terminals A and B in Fig. 3.34.

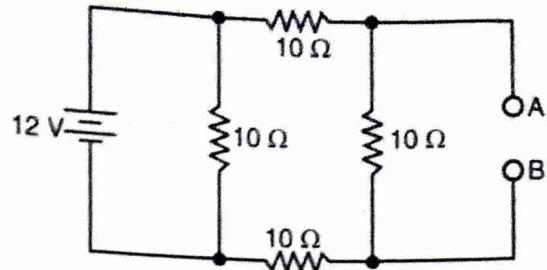


Fig. 3.34

- (i) $E_{Th} = 6 \text{ V}, R_{Th} = 5 \Omega$
 - (ii) $E_{Th} = 3.5 \text{ V}, R_{Th} = 4.5 \Omega$
 - (iii) $E_{Th} = 4 \text{ V}, R_{Th} = 6.67 \Omega$
 - (iv) $E_{Th} = 8 \text{ V}, R_{Th} = 4 \Omega$

64. Find the Thevenin equivalent circuit to the left of terminals x-y in Fig. 3.35.

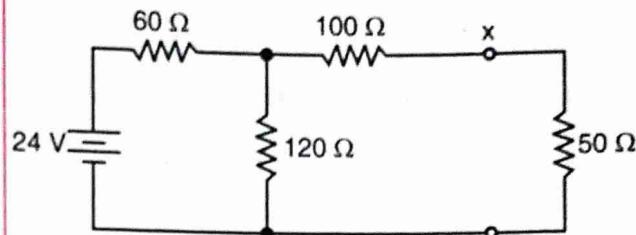


Fig. 3.35

- (i) $E_{Th} = 16 \text{ V}$, $R_{Th} = 140 \Omega$
 - (ii) $E_{Th} = 8 \text{ V}$, $R_{Th} = 120 \Omega$
 - (iii) $E_{Th} = 18 \text{ V}$, $R_{Th} = 72 \Omega$
 - (iv) none of the above

65. Find Thevenin equivalent circuit lying to the right of terminals x-y in Fig. 3.36.

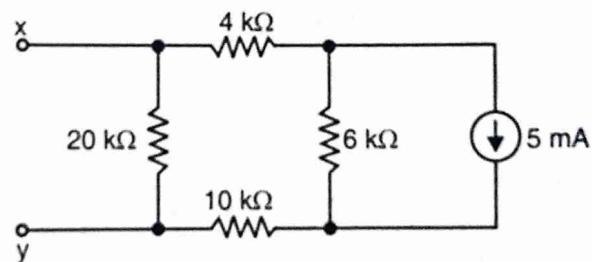


Fig. 3.36

- (i) $E_{Th} = 10 \text{ V}, R_{Th} = 1 \text{ k}\Omega$
 - (ii) $E_{Th} = 15 \text{ V}, R_{Th} = 10 \text{ k}\Omega$
 - (iii) $E_{Th} = 12 \text{ V}, R_{Th} = 5 \text{ k}\Omega$
 - (iv) $E_{Th} = 6 \text{ V}, R_{Th} = 12 \text{ k}\Omega$

66. Find the voltage across R_L in Fig. 3.37 when $R_L = 1 \text{ k}\Omega$ and $2 \text{ k}\Omega$.

- (i) 9 V, 12 V (ii) 4 V, 8 V
 (iii) 16 V, 24 V (iv) 18 V, 36 V

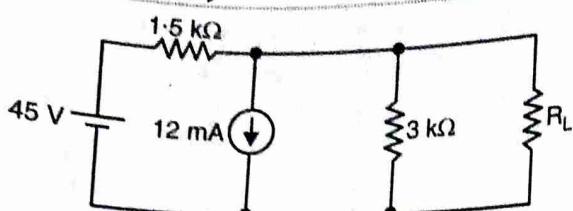


Fig. 3.37

67. Find the Norton equivalent current source at terminals x-y in Fig. 3.38.

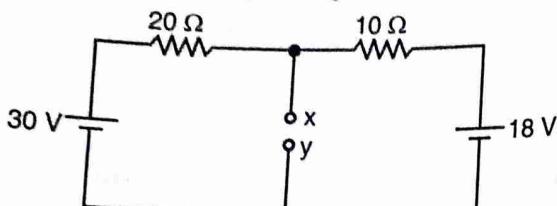


Fig. 3.38

- (i) $I_N = 4 \text{ mA}$, $R_N = 5 \Omega$
- (ii) $I_N = 1 \text{ A}$, $R_N = 3.5 \Omega$
- (iii) $I_N = 2.5 \text{ A}$, $R_N = 6 \Omega$
- (iv) $I_N = 3.3 \text{ A}$, $R_N = 6.67 \Omega$

68. Find Norton equivalent current to the left of terminals x-y in Fig. 3.39.

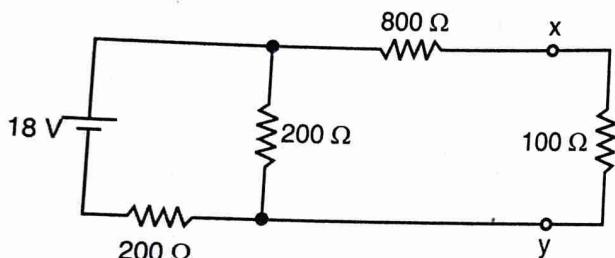


Fig. 3.39

- (i) $I_N = 1 \text{ A}$
- (ii) $I_N = 0.1 \text{ A}$
- (iii) $I_N = 0.01 \text{ A}$
- (iv) none of the above

69. The ammeter labelled A in Fig. 3.40 reads 35 mA. Is 2.2 kΩ resistor shorted? Assume ammeter has negligible resistance.

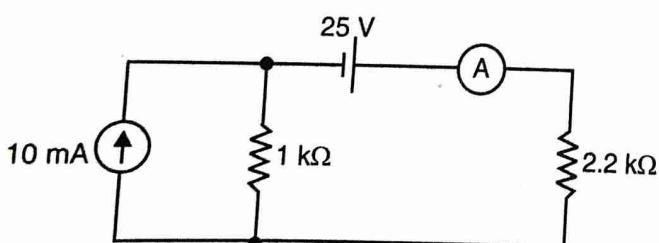


Fig. 3.40

- (i) No
- (ii) Yes
- (iii) may or may not be
- (iv) Cannot say

70. In Fig. 3.40, what should be the ammeter reading if 2.2 kΩ resistor is not shorted?
- (i) 10.94 mA
 - (ii) 2.5 mA
 - (iii) 12.23 mA
 - (iv) 6.45 mA

71. Find the value of R_L in Fig. 3.41 to obtain maximum power in R_L .

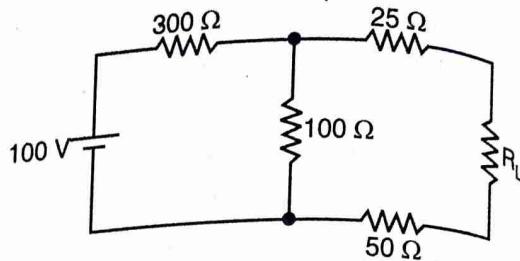


Fig. 3.41

- (i) 100 Ω
- (ii) 75 Ω
- (iii) 250 Ω
- (iv) 150 Ω

72. In Fig. 3.41, find the maximum power in R_L .
- (i) 2 W
 - (ii) 1.042 W
 - (iii) 2.34 W
 - (iv) 4.52 W

73. What per cent of the maximum power is delivered to R_L in Fig. 3.42 when $R_L = 2R_{Th}$?

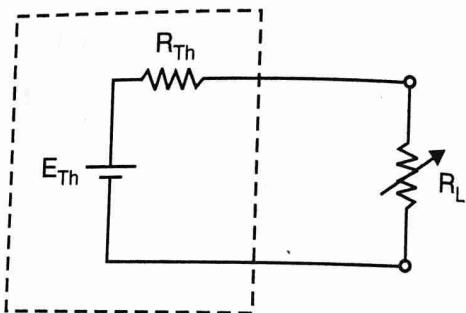


Fig. 3.42

- (i) 70% of P_L (max)
- (ii) 65% of P_L (max)
- (iii) 88.89% of P_L (max)
- (iv) none of the above

74. What per cent of the maximum power is delivered to R_L in Fig. 3.42 when $R_L = R_{Th}/2$?
- (i) 65%
 - (ii) 70%
 - (iii) 88.89%
 - (iv) none of the above

75. Find Millman's equivalent current source w.r.t. terminals x-y in Fig. 3.43.

- (i) Single current source of 0.1 A and resistance 75 Ω
- (ii) Single current source of 2 A and resistance 50 Ω

- (iii) Single current source of 1 A and resistance 25Ω
 (iv) none of the above

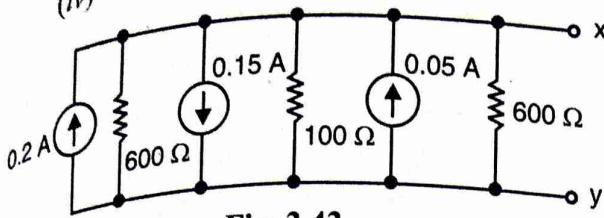


Fig. 3.43

76. Use superposition principle to find current through R_1 in Fig. 3.44.

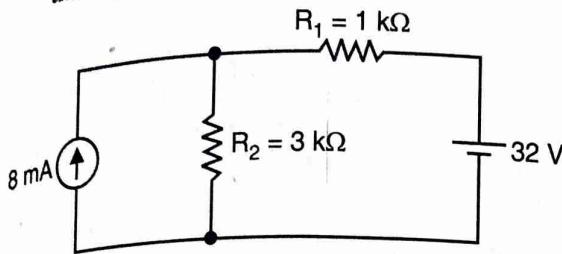


Fig. 3.44

- (i) $1\text{ mA} \leftarrow$ (ii) $2\text{ mA} \leftarrow$
 (iii) $1.5\text{ mA} \rightarrow$ (iv) $2.5\text{ mA} \leftarrow$

77. Use superposition principle to find current through R_1 in the circuit shown in Fig. 3.45.

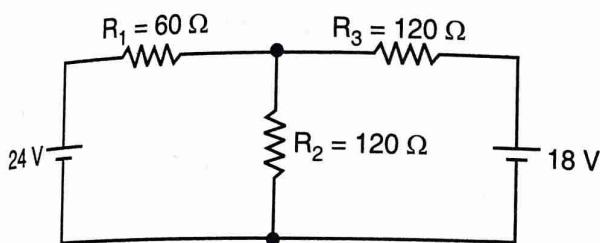


Fig. 3.45

- (i) $0.2\text{ A} \leftarrow$ (ii) $0.25\text{ A} \rightarrow$
 (iii) $0.125\text{ A} \rightarrow$ (iv) $0.5\text{ A} \rightarrow$

78. Find Thevenin equivalent circuit to the left of terminals x-y in Fig. 3.46.

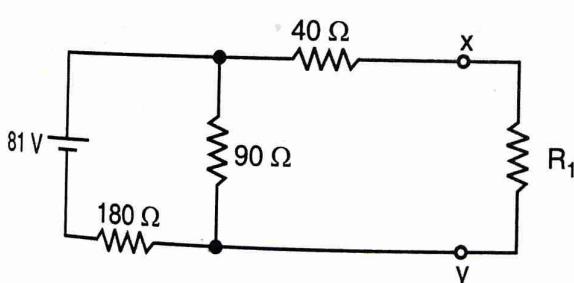


Fig. 3.46

- (i) $E_{Th} = 5\text{ V}; R_{Th} = 4.5\Omega$
 (ii) $E_{Th} = 6\text{ V}; R_{Th} = 5\Omega$
 (iii) $E_{Th} = 4.5\text{ V}; R_{Th} = 10\Omega$
 (iv) $E_{Th} = 10\text{ V}; R_{Th} = 9\Omega$

79. Convert delta network shown in Fig. 3.47 to equivalent wye network.

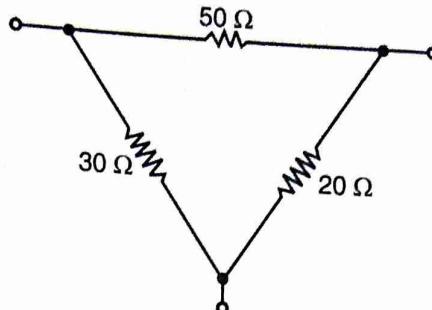
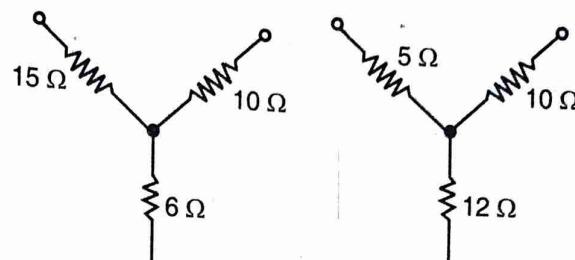
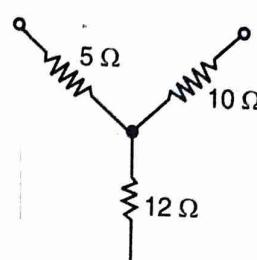


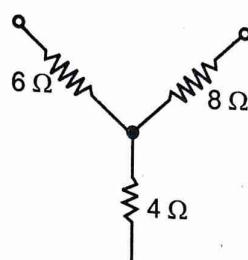
Fig. 3.47



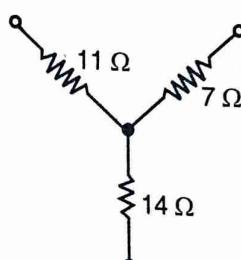
(i)



(ii)



(iii)



(iv)

80. What percentage of the maximum power is delivered to a load if load resistance is 10 times greater than the Thevenin resistance of the source to which it is connected?

- (i) 25% (ii) 40%
 (iii) 35% (iv) 33.06%

81. Mesh current analysis is based on

- (i) Kirchhoff's current law
 (ii) Kirchhoff's voltage law
 (iii) Maxwell's law
 (iv) none of the above

82. Nodal analysis is based on

- (i) Kirchhoff's current law
 (ii) Kirchhoff's voltage law
 (iii) Maxwell's law
 (iv) none of the above

- 83.** For the circuit shown in Fig. 3.48, V_1 and V_2 are related as :

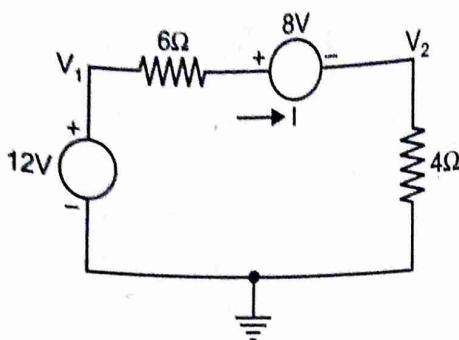


Fig. 3.48

- (i) $V_1 = 6I + 8 + V_2$
- (ii) $V_1 = 6I - 8 + V_2$
- (iii) $V_1 = -6I + 8 + V_2$
- (iv) $V_1 = -6I - 8 + V_2$

- 84.** In the circuit shown in Fig. 3.48, the voltage V_2 is
- (i) -8 V
 - (ii) -1.6 V
 - (iii) 1.6 V
 - (iv) 8 V

- 85.** The current I in the circuit shown in Fig. 3.49 is

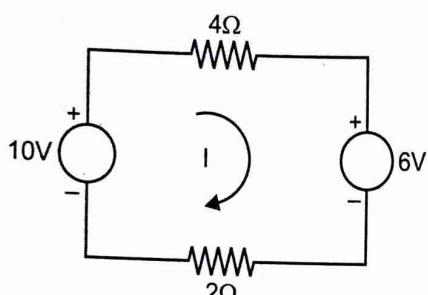


Fig. 3.49

- (i) -2.667 A
- (ii) 2.667 A
- (iii) -0.667 A
- (iv) 0.667 A

- 86.** The mesh equation for the circuit in Fig. 3.49 is

- (i) $10 + 4I + 6 + 2I = 0$
- (ii) $-10 + 4I + 6 + 2I = 0$
- (iii) $10 + 4I - 6 + 2I = 0$
- (iv) $-10 + 4I - 6 + 2I = 0$

- 87.** The current through a branch in a linear circuit is 2A when the input source voltage is 10V. If the voltage is reduced to 1V and the polarity is reversed, the current through the branch is

- (i) -0.2 A
- (ii) 0.2 A

- 88.** The superposition theorem applies to
- (i) Current/voltage calculations
 - (ii) Power calculations
 - (iii) Current and power calculations
 - (iv) Voltage and power calculations
- 89.** The Thevenin resistance at terminals a and b in the circuit in Fig. 3.50 is

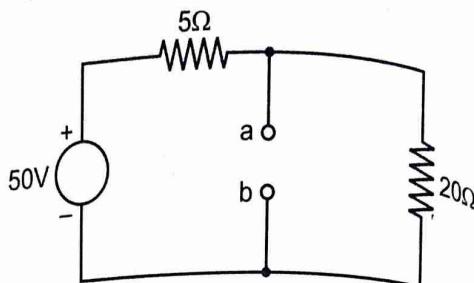


Fig. 3.50

- (i) 25 Ω
- (ii) 20 Ω
- (iii) 4 Ω
- (iv) 5 Ω

- 90.** The Thevenin voltage across terminals a and b in the circuit in Fig. 3.50 is
- (i) 50 V
 - (ii) 20 V
 - (iii) 10 V
 - (iv) 40 V

- 91.** The Norton current at terminals a and b in the circuit in Fig. 3.50 is

- (i) 2.5 A
- (ii) 10 A
- (iii) 2 A
- (iv) 0 A

- 92.** Referring to Fig. 3.50, the Norton resistance at terminals a and b is

- (i) 4 Ω
- (ii) 25 Ω
- (iii) 20 Ω
- (iv) 5 Ω

- 93.** The Norton resistance at terminals A and B in the circuit shown in Fig. 3.51 is

- (i) 150 Ω
- (ii) 600 Ω
- (iii) 75 Ω
- (iv) 300 Ω

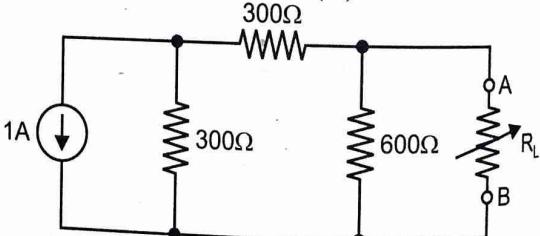


Fig. 3.51

- 94.** In the circuit shown in Fig. 3.51, find the Norton current at terminals A and B .
- (i) 0.25 A
 - (ii) 0.75 A
 - (iii) 0.5 A
 - (iv) none of the above

Answers to Objective Questions

- | | | | | | | | | | |
|-----|-------|-----|-------|-----|-------|-----|-------|------|-------|
| 1. | (ii) | 2. | (ii) | 3. | (iii) | 4. | (iii) | 5. | (iv) |
| 6. | (iii) | 7. | (iii) | 8. | (iii) | 9. | (i) | 10. | (ii) |
| 11. | (i) | 12. | (ii) | 13. | (iii) | 14. | (ii) | 15. | (iv) |
| 16. | (i) | 17. | (ii) | 18. | (ii) | 19. | (iv) | 20. | (iii) |
| 21. | (iii) | 22. | (ii) | 23. | (iii) | 24. | (i) | 25. | (ii) |
| 26. | (iii) | 27. | (ii) | 28. | (i) | 29. | (iv) | 30. | (i) |
| 31. | (ii) | 32. | (iv) | 33. | (iii) | 34. | (iv) | 35. | (i) |
| 36. | (iii) | 37. | (ii) | 38. | (i) | 39. | (iv) | 40. | (i) |
| 41. | (i) | 42. | (iii) | 43. | (i) | 44. | (ii) | 45. | (iv) |
| 46. | (iii) | 47. | (i) | 48. | (i) | 49. | (ii) | 50. | (iii) |
| 51. | (iv) | 52. | (i) | 53. | (iii) | 54. | (ii) | 55. | (iv) |
| 56. | (iii) | 57. | (ii) | 58. | (ii) | 59. | (i) | 60. | (ii) |
| 61. | (ii) | 62. | (iv) | 63. | (iii) | 64. | (i) | 65. | (ii) |
| 66. | (i) | 67. | (iv) | 68. | (iii) | 69. | (ii) | 70. | (i) |
| 71. | (iv) | 72. | (ii) | 73. | (iii) | 74. | (iii) | 75. | (i) |
| 76. | (ii) | 77. | (iii) | 78. | (iv) | 79. | (i) | 80. | (iv) |
| 81. | (ii) | 82. | (i) | 83. | (i) | 84. | (iii) | 85. | (iv) |
| 86. | (ii) | 87. | (i) | 88. | (i) | 89. | (iii) | 90. | (iv) |
| 91. | (ii) | 92. | (i) | 93. | (iv) | 94. | (iii) | 95. | (ii) |
| 96. | (i) | 97. | (iv) | 98. | (iii) | 99. | (ii) | 100. | (i) |

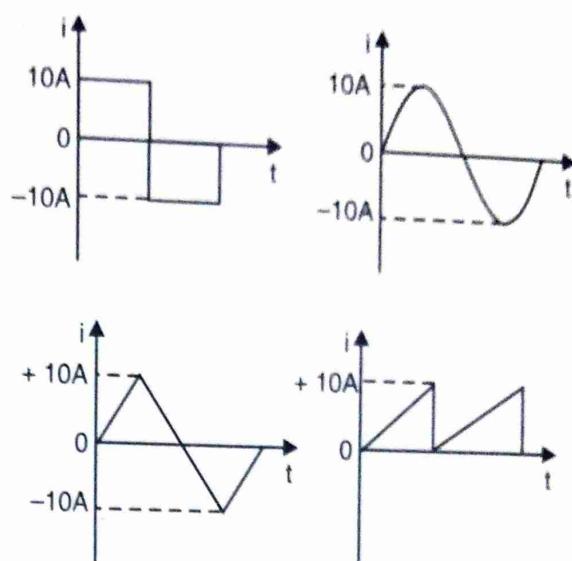
Objective Questions

1. The a.c. system is preferred to d.c. system because
- (i) a.c. voltages can be easily changed in magnitude
 - (ii) d.c. motors do not have fine speed control
 - (iii) high-voltage a.c. transmission is less efficient
 - (iv) d.c. voltages cannot be used for domestic appliances
2. In a.c. system, we generate sinewave form because
- (i) it can be easily drawn
 - (ii) it produces least disturbance in electrical circuits
 - (iii) it is nature's standard
 - (iv) other waves cannot be produced easily
3. will work only on d.c. supply.
- (i) Electric lamp (ii) Refrigerator
 - (iii) Heater (iv) Electroplating
4. will produce a.c. voltage.
- (i) Friction
 - (ii) Photoelectric effect
 - (iii) Thermal energy
 - (iv) Crystal
5. A coil is rotating in the uniform field of an 8-pole generator. In one revolution of the coil, the number of cycles generated by the voltage is
- (i) one (ii) two
 - (iii) four (iv) eight
6. An alternating voltage is given by $v = 20 \sin 157 t$. The frequency of the alternating voltage is

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15. An alternating current whose average value is 1 A will produce 1 A d.c. under similar conditions.
- less heat than
 - more heat than
 - the same heat as
 - none of the above
16. A sinusoidal alternating current has maximum value of I_m . Its average value will be
- I_m/π
 - $I_m/2\pi$
 - $2 I_m/\pi$
 - none of the above
17. The area of a sinusoidal wave over a complete cycle is
- max. value $\div 2$
 - $2 \times$ max. value
 - max. value $\div \pi$
 - max. value $\div 2\pi$
18. An alternating voltage is given by $v = 200 \sin 314 t$. Its r.m.s. value will be
- 100 V
 - 282.8 V
 - 141.4 V
 - 121.4 V
19. The r.m.s. value of sinusoidally varying current is that of its average value.
- more than
 - less than
 - same as
 - none of the above
20. Alternating voltages and currents are expressed in r.m.s. values because
- they can be easily determined
 - calculations become very simple
 - they give comparison with d.c.
 - none of the above
21. The average value of $\sin^2 \theta$ over a complete cycle is
- +1
 - 1
 - 1/2
 - zero
22. The average value of $\sin \theta$ over a complete cycle is
- zero
 - +1
 - 1
 - 1/2
23. An alternating current is given by $i = I_m \sin \theta$. The average value of squared wave of this current over a complete cycle is
- $I_m^2/2$
 - I_m/π
 - $2I_m/\pi$
 - $2 I_m$

- 24.** The form factor of a sinusoidal wave is
 (i) 1.414 (ii) 1.11
 (iii) 2 (iv) 1.5
- 25.** The filament of a vacuum tube requires 0.4 A d.c. to heat it. The r.m.s. value of a.c. required is
 (i) $0.4 \times \sqrt{2}$ A (ii) $0.4 + 2$ A
 (iii) $0.8 + \sqrt{2}$ A (iv) 0.4 A
- 26.** A 100 V peak a.c. is as effective as d.c.
 (i) 100 V (ii) 50 V
 (iii) 70.7 V (iv) none of the above
- 27.** The form factor of a wave is 1.
 (i) sinusoidal (ii) square
 (iii) triangular (iv) saw tooth
- 28.** Out of the following, wave is the peakiest.
 (i) sinusoidal (ii) square
 (iii) rectangular (iv) triangular
- 29.** The peak factor of a sine waveform is
 (i) 1.11 (ii) 1.414
 (iii) 2 (iv) 1.5
- 30.** When a 15-V square wave is connected across a 50-V a.c. voltmeter, it will read
 (i) 15 V (ii) $15 \times \sqrt{2}$ V
 (iii) $15/\sqrt{2}$ V (iv) none of the above
- 31.** The breakdown voltage of an insulation depends upon value of alternating voltage.
 (i) average (ii) r.m.s.
 (iii) peak (iv) twice the r.m.s.
- 32.** The peak factor of a half-wave rectified a.c. is
 (i) 1.57 (ii) 2
 (iii) 1.11 (iv) 1.4142
- 33.** The form factor of a half-wave rectified a.c. is
 (i) 2 (ii) 1.11
 (iii) 1.414 (iv) 1.57

- 34.** When 200 V sinusoidal peak-to-peak wave is connected across an a.c. voltmeter, it will read
 (i) 141.4 V (ii) 50 V
 (iii) 70.7 V (iv) none of the above
- 35.** In Fig. 11.17, the wave that will produce maximum heat under similar conditions is

- 36.** In Fig. 11.17, wave will have the highest half-cycle average value.
 (i) saw tooth (ii) square
 (iii) triangular (iv) sinusoidal
- 37.** The average value of a sinusoidal current is 100 A. Its r.m.s. value is
 (i) 63.7 A (ii) 70.7 A
 (iii) 141.4 A (iv) 111 A
- 38.** A current wave is given by $i = 4 + 2\sqrt{2} \sin 30 + 4\sqrt{2} \sin 50$. The r.m.s. value of current wave is
 (i) 10 A (ii) 6 A
 (iii) $\sqrt{56}$ A (iv) 5 A
- 39.** In Fig. 11.18, current is given by $i = I_m \sin \theta$. The voltage equation will be
 (i) $V_m \sin \theta$ (ii) $V_m \sin (\theta + \phi)$
 (iii) $V_m \sin (\theta - \phi)$ (iv) $V_m \sin (\theta - 2\phi)$

- 40.** The waveforms of voltage and current shown in Fig. 11.18 would exist in circuit.

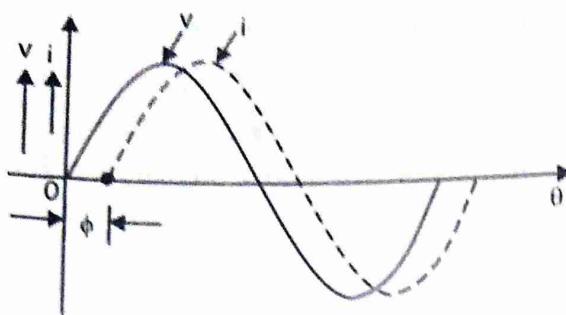


Fig. 11.18

- (i) a resistive
- (ii) a capacitive
- (iii) an inductive
- (iv) none of the above

- 41.** An alternating voltage or current is a

- (i) scalar quantity (ii) vector quantity
- (iii) phasor (iv) none of the above

- 42.** Three parallel circuits take the following currents:

$$i_1 = 5 \sin 314 t; i_2 = 30 \sin (314 t + \pi/2); \\ i_3 = 25 \sin (314 t - \pi/2)$$

The expression for the resultant current is

- (i) $25 \sin (314 t + \pi/3)$
- (ii) $5 \sin (314 t + \pi/2)$
- (iii) $10 \sin (314 t - \pi/6)$
- (iv) $5\sqrt{2} \sin (314 t + \pi/4)$

- 43.** The sum of the following two e.m.f.s will be

$$e_1 = 10 \sin \omega t; e_2 = 10 \cos \omega t$$

- (i) 10 (ii) $20 \sin \omega t$
- (iii) $14.14 \cos \omega t$
- (iv) $14.14 \sin (\omega t + \pi/4)$

- 44.** Each of the three coils generates an e.m.f. of 230 V. The e.m.f. of second leads that of the first by 120° and the third lags behind the first by the same angle. The resultant e.m.f. across the series combination of the coils is

- (i) 0 V (ii) 230 V
- (iii) 690 V (iv) none of the above

- 45.** In Fig. 11.19, $I_1 + I_2$ is equal to
- (i) 3 A (ii) 3.72 A
 - (iii) 9 A (iv) 3.43 A

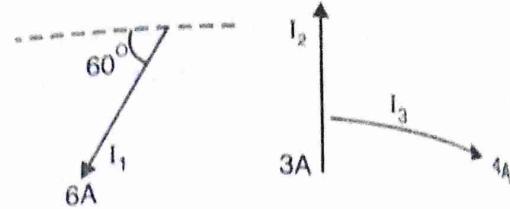


Fig. 11.19

- 46.** In Fig. 11.19, $I_2 + I_3$ is equal to

- (i) 7 A (ii) $\sqrt{13}$ A
- (iii) 5 A (iv) none of the above

- 47.** In Fig. 11.20, $E_1 + E_2 + E_3 + E_4$ is equal to

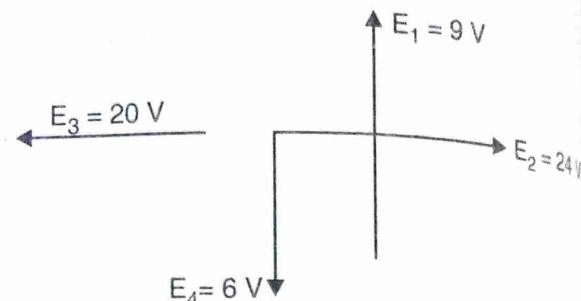


Fig. 11.20

- (i) 7 V (ii) 5 V
- (iii) 20 V (iv) none of the above

- 48.** In Fig. 11.20, will have the least value.

- (i) $E_1 + E_2 + E_3 + E_4$
- (ii) $E_1 + E_2 - E_3 - E_4$
- (iii) $E_1 + E_2 + E_3 - E_4$
- (iv) $-E_1 + E_4$

- 49.** In a pure resistive a.c. circuit, the frequency of power curve is that of the circuit frequency.

- (i) half (ii) twice
- (iii) thrice (iv) same as

- 50.** In a pure resistive circuit, the instantaneous voltage and current are given by ;

$$v = 250 \sin 314 t \text{ volts}$$

$$i = 10 \sin 314 t \text{ amperes}$$

The peak power in the circuit is

- (i) 1250 W (ii) 25 W
- (iii) 2500 W (iv) 250 W

- Q.** In the above question, the average power in the circuit is
 (i) 2500 W (ii) 250 W
 (iii) 25 W (iv) 1250 W
- Q.** An alternating voltage $v = V_m \sin \theta$ is applied to a pure inductive circuit. The current equation will be
 (i) $I_m \sin \theta$ (ii) $I_m \sin (\theta - \pi/2)$
 (iii) $I_m \sin (\theta + \pi/2)$ (iv) $I_m \sin (\theta + \pi/4)$
- Q.** The inductive reactance of a circuit is frequency.
 (i) directly proportional to
 (ii) inversely proportional to
 (iii) independent of
 (iv) none of the above
- Q.** Power absorbed in a pure inductive circuit is zero because
 (i) reactive component of current is zero
 (ii) active component of current is maximum
 (iii) power factor of the circuit is zero
 (iv) reactive and active components of current cancel out
- Q.** An alternating voltage $v = V_m \sin \theta$ is applied to a pure capacitive circuit. The current equation will be
 (i) $I_m \sin \theta$ (ii) $I_m \sin (\theta - \pi/2)$
 (iii) $I_m \sin (\theta + \pi/4)$ (iv) $I_m \sin (\theta + \pi/2)$
- Q.** The capacitive reactance of a circuit is frequency.
 (i) independent of
 (ii) inversely proportional to
 (iii) directly proportional to
 (iv) none of the above
- Q.** What is the instantaneous output of a generator at 20 electrical degrees if its output is 170 V at 90 electrical degrees?
 (i) 30 V (ii) 58.1 V
 (iii) 24.3 V (iv) 42.6 V
- Q.** What is the peak-to-peak value for 120 V a.c.?
 (i) 240 V (ii) 480 V
 (iii) 339 V (iv) 391 V

- 59.** A 500 V sine wave generator appears across a $10 \text{ k}\Omega$ resistor. What is the instantaneous current in the resistor at a phase angle of 35° ?
 (i) 12.4 mA (ii) 22.6 mA
 (iii) 52 mA (iv) 40.6 mA
- 60.** The instantaneous value of $55 \sin (2\pi \times 16 t)$ mA at $t = 1/32$ second is
 (i) 0 mA (ii) 5.08 mA
 (iii) 1.2 mA (iv) 2.3 mA
- 61.** Find the average value of $v(t) = 6 + 2 \sin (2\pi \times 100 t)$ volts
 (i) 6 V (ii) 12 V
 (iii) 9.4 V (iv) 16.3 V
- 62.** The instantaneous value of $i(t) = 16 \sin (2\pi \times 18 \times 10^4 t - 15^\circ)$ mA at $t = 2 \mu\text{s}$ is
 (i) 13.4 mA (ii) 14.55 mA
 (iii) 8.9 mA (iv) none of the above
- 63.** The average value of 2 A d.c. current is
 (i) 1 A (ii) 4 A
 (iii) 2 A (iv) 3 A
- 64.** The effective value of 2 A d.c. current is
 (i) 1 A (ii) 4 A
 (iii) 16 A (iv) 2 A
- 65.** The voltage across a $0.5 \mu\text{F}$ capacitor is $v(t) = 16 \sin (2 \times 10^3 t)$ V. The capacitive reactance of the capacitor is
 (i) $1.5 \text{ k}\Omega$ (ii) $1 \text{ k}\Omega$
 (iii) $2.4 \text{ k}\Omega$ (iv) $3.6 \text{ k}\Omega$
- 66.** The a.c. current through a $20 \mu\text{F}$ capacitor is $i(t) = 3 \sin (800 t)$ A. What is the peak voltage across the capacitor?
 (i) 187.5 V (ii) 90.5 V
 (iii) 118.4 V (iv) 55.6 V
- 67.** The current in a $2.2 \text{ k}\Omega$ resistor is $i(t) = 5 \sin (2\pi \times 100 t + 45^\circ)$ mA. What is the instantaneous value of resistor voltage at $t = 0.4 \text{ ms}$?
 (i) 6.8 V (ii) 11.3 V
 (iii) 9.47 V (iv) 12.62 V
- 68.** The e.m.f. is given by $e = 8 \sin \omega t + 6 \sin 2 \omega t$ volts. The r.m.s. value is
 (i) 10.2 V (ii) 12 V
 (iii) 7.07 V (iv) none of the above

Answers to Objective Questions

- | | | | | |
|-----------|-----------|-----------|-----------|-----------|
| 1. (i) | 2. (ii) | 3. (iv) | 4. (iv) | 5. (iii) |
| 6. (ii) | 7. (iii) | 8. (iv) | 9. (ii) | 10. (iii) |
| 11. (iii) | 12. (iii) | 13. (ii) | 14. (iii) | 15. (i) |
| 16. (iii) | 17. (ii) | 18. (iii) | 19. (i) | 20. (iii) |
| 21. (iii) | 22. (i) | 23. (i) | 24. (ii) | 25. (iv) |
| 26. (iii) | 27. (ii) | 28. (iv) | 29. (ii) | 30. (i) |
| 31. (iii) | 32. (ii) | 33. (iv) | 34. (iii) | 35. (i) |
| 36. (ii) | 37. (iv) | 38. (ii) | 39. (ii) | 40. (iii) |
| 41. (iii) | 42. (iv) | 43. (iv) | 44. (i) | 45. (ii) |
| 46. (iii) | 47. (ii) | 48. (i) | 49. (ii) | 50. (iii) |
| 51. (iv) | 52. (ii) | 53. (i) | 54. (iii) | 55. (iv) |
| 56. (ii) | 57. (ii) | 58. (iii) | 59. (iv) | 60. (i) |
| 61. (i) | 62. (ii) | 63. (iii) | 64. (iv) | 65. (ii) |
| 66. (i) | 67. (iii) | 68. (iii) | 69. (ii) | 70. (iv) |
| | 71. (iii) | 72. (ii) | 73. (iv) | 74. (iv) |
| | | | | 75. (iii) |