SMART EDITION

1
VOLUME

ELECTRICAL ENGINEERING

MCQ

Assistant Engineer & Junior Engineer

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Power Electronics • Digital Electronics

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Also Useful for State-AE/JE, PSUs and PSCs Exams

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Preface

This book has been written to meet the growing requirements of candidates appearing for State Engineering Service Examination, Junior Engineer, Public Sector Units, RRB-JE and Metro Exams. Though every candidate has ability to succeed but competitive environment, in-depth knowledge, quality guidance, time management and good source of study is required to achieve goals.

This book includes Multiple Choice Questions (MCQ Volume-I) which works as a mock exam practice for the reader. Questions of all the subject have been organized in systematic, concepts oriented and error less manner so that it become easy and interesting for even a beginner to understand. It is a very convenient book and must be solved by candidate aiming for competitive exams.

After solving this booklet students can feel encouraged and develop confidence to attempt each and every type of numerical as well as theoretical problems. Each problems explains solving approach so that at the end, so the reader is well equipped to be able to apply any type of problem solving requirement and distinctly choose one strategy or type from the other.

We hope this book will be proved an important tool to succeed in State Engineering Service Examination, Junior Engineer, Public Sector Units, RRB-JE and Metro Exams.

It is earnestly hoped that with the extensive additions and revisions, the present edition will facilitate the students not only in preparing themselves for competitive examinations but also in preparing for their regular examinations and prove more useful to the students than the earlier editions.

Even though, enough readings were given for correcting the error and printing mistakes, due to human tendency there could be some minor typos in the book. If any such typos found, they will be highly appreciated and incorporated in the next edition. Also, please provide your valuable suggestions at :engineers.academy.india@gmail.com

All the Best!

Engineers Academy Editorial Board

CONTENTS

UNIT-I

NETWORK THEORY

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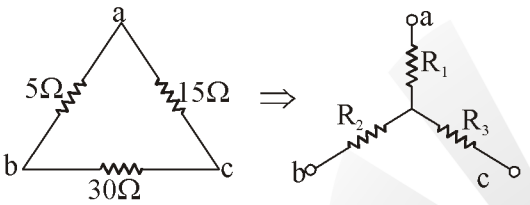
CHAPTER 1

BASICS OF CIRCUIT AND CIRCUIT LAW

OBJECTIVE QUESTIONS

1. A delta connected network with its Y-equivalent is shown in figure. The resistances R_1, R_2 and R_3 (in ohms) are respectively



(a) 1.5, 3 and 9 (b) 3, 9 and 1.5

(c) 9, 3 and 1.5 (d) 3, 1.5 and 9

2. A network contains linear resistors and ideal voltage sources. If values of all the resistors are doubled then the voltage across each resistor is

(a) Halved

(b) Doubled

(c) Increased by four times

(d) Not changed

3. A 3 H inductor has 2000 turns. How many turns must be added to increase the inductance to 5H?

(a) 1000 turns (b) 2500 turns

(c) 2582 turns (d) 582 turns

4. An electric circuit with 10 branches and 7 nodes will have

(a) 3 loop equations

(b) 4 loop equations

(c) 7 loop equations

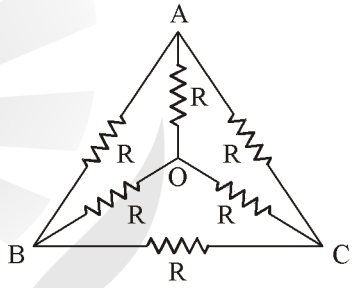
(d) 10 loop equations

5. The response of network is $i(t) = Kt\, e^{-\alpha t}$ for $t \geq 0$ where α is real positive. The value of 't' at which the i(t) will become maximum, is

(a) α (b) 2α

(c) $\frac{1}{\alpha}$ (d) α^2

6. The effective resistance between the terminals A and B in the circuit shown in the figure is



(a) R (b) R–1

(c) $\frac{R}{2}$ (d) $\frac{6}{11}R$

7. If the length of a wire of resistance R is uniformly stretched to n times its original value, its new resistance is

(a) nR (b) $\frac{R}{n}$

(c) n^2R (d) $\frac{R}{n^2}$

8. Two wires A and B of the same material and length L and 2L have radius r and 2r respectively. The ratio of their specific resistance will be

(a) 1 : 1 (b) 2 : 1

(c) 1 : 4 (d) 1 : 8

9. Two incandescent light bulbs of 40 W and 60 W rating are connected in series across the mains. Then

(a) The bulbs together consume 100 W

(b) The bulbs together consume 50 W

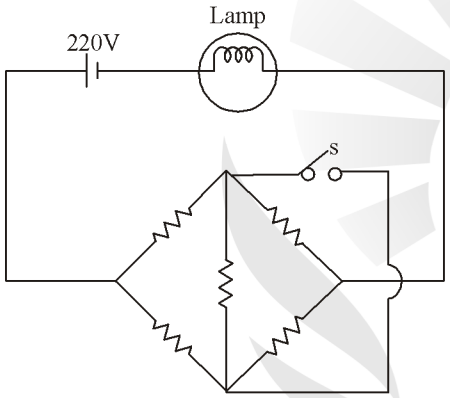
(c) The 60 W bulb glows brighter

(d) The 40 W bulb glows brighter

10. Twelve 1 Ω resistances are used as edges to form a cube. The resistance between the two diagonally opposite corners of the cube is

(a) $\frac{5}{6}\Omega$ (b) 1 Ω (c) $\frac{6}{5}\Omega$ (d) $\frac{3}{2}\Omega$

11. All resistance in the given circuit are at R Ω each. The switch is initially open. What happens to the lamp's intensity when the switch is closed?



(a) Increases

(b) Decreases

(c) Remains the same

(d) Depends on the value of R

12. If each branch of a delta circuit has impedance $\sqrt{3}$ Z, then each branch of equivalent star circuit has impedance would be

(a) $\frac{Z}{\sqrt{3}}$ (b) Z

(c) $2\sqrt{3}$ Z (d) $\frac{Z}{3}$

13. The dual of parallel RC circuit is a

(a) Series RC circuit (b) Series RL circuit

(c) Parallel RC circuit (d) Parallel RL circuit

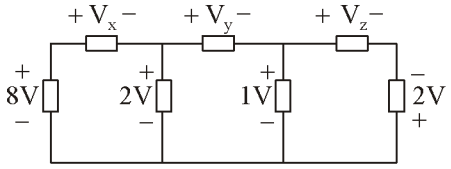
14. Two resistances are connected in parallel and each dissipates 40 W. The total power supplied by the source is equals to

(a) 80 W (b) 40 W

(c) 160 W (d) 20 W

[TNPSC AE - 2018]

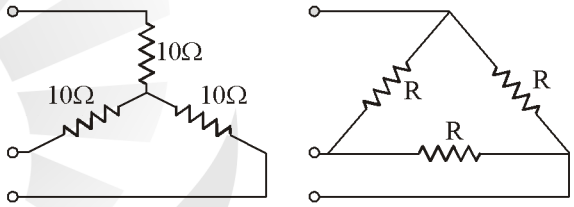
15. The value of V_x, V_y and V_z in figure shown are



(a) –6, 3, –3 (b) –6, –3, 1

(c) 6, 3, 3 (d) 6, 1, 3

16. Star connected load is shown in the figure. The equivalent delta connection has a value of R in Ω is



(a) 10 (b) 30

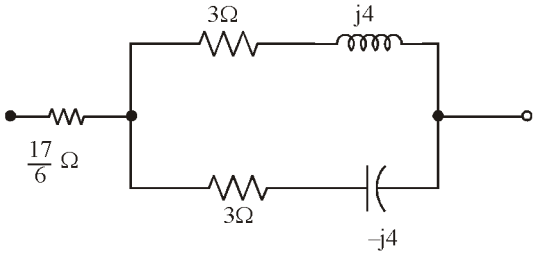
(c) $\frac{10}{3}$ (d) $\frac{20}{3}$

17. A lamp rated at 10 watt, 50 volts is proposed to be used in 110 volts, system. The wattage and resistance of the resistor to be connected in series with the lamp should be

(a) 15 W, 350 Ω (b) 10 W, 250 Ω

(c) 12 W, 300 Ω (d) 15 W, 250 Ω

18. For the circuit shown below the total impedance is



(a) (7 + j0) (b) (5 + j0)

(c) (0 + j8) (d) (7 + j10)

19. ***Assertion (A):*** Two wires of same length with different cross sectional areas are connected in series. The heat produced by the current is more in the thicker wire.

Reason (R): The thicker wire has low resistance.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is NOT the correct explanation of A

(c) A is true but R is false

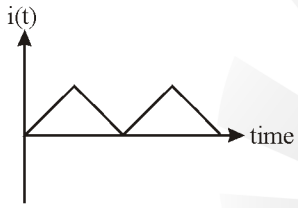
(d) A is false but R is true.

20. What is the power absorbed by a 3-phase load?

(a) $3\ V_L\ I_L \cos\phi$ (b) $\sqrt{3}\ V_L\ I_L \cos\phi$

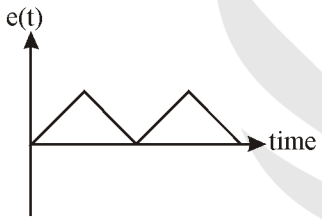
(c) $3\ V_L\ I_L \sin\phi$ (d) $\sqrt{3}\ V_L\ I_L \tan\phi$

21. The waveform of current flowing in a pure inductor is shown in the given figure.

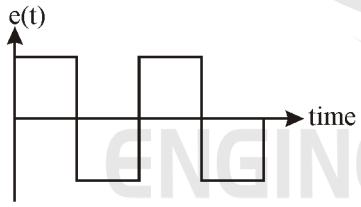


The wave form of the induced voltage in the inductor will be.

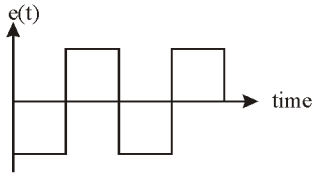
(a)



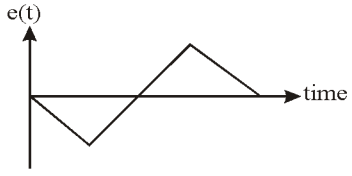
(b)



(c)



(d)



22. In a balanced delta connected resistive load when one resistor is open-circuited, then the power drawn by the load would be

(a) Is reduced by $\frac{1}{3}$ (b) Is increased by $\frac{1}{3}$

(c) Remains same (d) Is reduced by $\frac{1}{2}$

23. A cylindrical block of certain material has a resistance R as measured between its circular faces. To half the resistance, all the dimensions of the block must be

(a) Doubled

(b) Halved

(c) Decreased by $\sqrt{2\pi}$

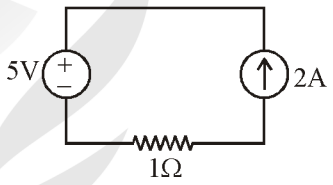
(d) Increased by $\sqrt{2\pi}$

24. The time rate of change of a current passed through a 1mH inductor is 2 mA/s. This means that the voltage across the inductor is.

(a) 0.5×10^{-6} V (b) 0.5 V

(c) 2×10^{-6} V (d) 2 V

25. For the circuit shown in figure



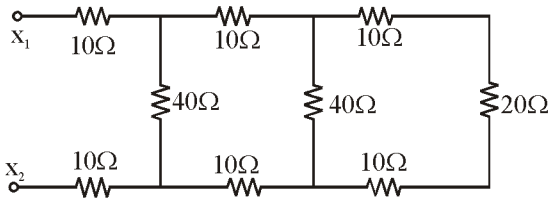
(a) The current depends on the resistor

(b) The Voltage across the current source depends on the resistor.

(c) The current depends on the voltage source

(d) If the resistor were zero, the current would tend to infinity.

26. The approximate equivalent resistance at the points x_1 and x_2 in the circuit shown below



(a) 60 Ω (b) 40 Ω

(c) 80 Ω (d) 20 Ω

27. Two identical resistive loads consumes W watts each when connected in parallel across an ideal current source of I amperes. If, instead, they were connected in series with the same source, their total consumption

(a) Would half

(b) Would double

(c) Would remain the same

(d) Would increase by a factor of 4

28. In a three-phase delta-connected balanced load

(a) Line current is equal to the phase current

(b) Line current is three times the phase current

(c) Line current is $\sqrt{3}$ times the phase current

(d) Line current is the sum of the three phases current

29. Which of the following statement is true?

(a) Thevenin reduction can be used only if there are no current sources

(b) In ac circuits, KCL holds only for average current and not for instantaneous currents.

(c) Capacitors are generally less lossy than inductors

(d) Linear networks can have dependent sources.

30. Two lights bulb of 40W and 80W are connected in series. Which one of the following statement is false?

(a) The current drawn is lesser than what either bulb would draw alone

(b) The voltage across a 80W bulb is lesser than that across the 40W bulb.

(c) The power dissipated by the 80W bulb is lesser than that by the 40W bulb.

(d) The current drawn in the average of what of either bulb would draw alone

31. A house served by a 220V supply light and is protected by a 9 Ampere fuse. The maximum number of 60W bulbs in parallel that can be turned on is

(a) 11 (b) 33

(c) 22 (d) 44

32. The secondary coil of an ideal 2:1 transformer has a 1F capacitor connected across its terminals. The referred impedance on the primary side is of an element

(a) L = 4H (b) C = 0.25 F

(c) L = 0.25 H (d) C = 4F

33. A parallel combination of N resistances is connected an ideal current source of I Amperes. The expression of the current in the k^{th} resistor R_k is

(a) $\left(\frac{R_k}{R_1+R_2+...+R_N}\right)I$ (b) $\left(\frac{\frac{1}{R_k}}{\frac{1}{R_1}+\frac{1}{R_2}+...+\frac{1}{R_N}}\right)I$

(c) $\left(\frac{R_k}{\frac{1}{R_1}+\frac{1}{R_2}+...+\frac{1}{R_n}}\right)I$ (d) $\left(\frac{1}{\frac{R_k}{R_1+R_2+...+R_N}}\right)I$

34. Consider two metallic wires W_1 and W_2 they are made up of same material and each has a circular cross-section. The diameter of W_2 is twice that of W_1 and the length of W_2 is four times that of W_1. Which one of the following statement is TRUE?

(a) Resistance of W_1 is half that of W_2

(b) Resistance of W_1 is equal to that of W_2

(c) Resistance of W_1 is twice that of W_2

(d) Resistance of W_1 is eight times that of W_2

35. Consider the following statements.

1. All the reciprocal networks are always symmetrical
2. All the passive networks are always reciprocal
3. All the non-linear networks are always non-reciprocal

Which of the above statements are TRUE.

(a) 1 and 2 (b) 2 and 3

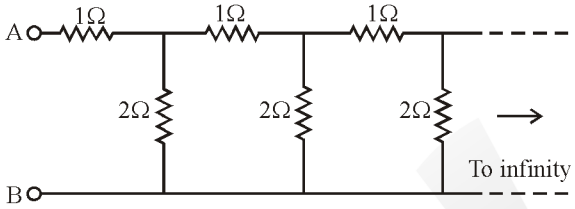
(c) 3 and 1 (d) 1, 2 and 3

36. The resistance of a parallel circuit consisting of two resistors is 12Ω. One of the resistance wires breaks and the effective resistance becomes 18Ω. The resistance of the broken wire is

(a) 48 Ω (b) 18 Ω

(c) 36 Ω (d) 24 Ω

37. The approximate equivalent resistance between terminals A and B for the following infinite ladder network comprising of 1 Ω and 2 Ω resistors is



(a) 1 Ω (b) 2 Ω

(c) 4 Ω (d) 0.5 Ω

38. A practical current source is usually represented by

(a) A resistance in series with an ideal current source

(b) A resistance in parallel with an ideal current source

(c) A resistance in parallel with an ideal voltage source

(d) None of the above

39. Two bulbs marked 200 watt, 250 volts and 100 watt, 250 volts are joined in series to 250 volts supply. Power consumed in circuits is

(a) 33 Watt (b) 67 Watt

(c) 100 Watt (d) 300 Watt

40. Two resistance R_1 and R_2 give combined resistance of 4.5 ohms when in series and 1 ohm when in parallel. The resistances R_1 and R_2 are respectively.

(a) 3 ohms and 6 ohms

(b) 3 ohms and 9 ohms

(c) 1.5 ohms and 3 ohms

(d) 1.5 ohms and 0.5 ohms

41. Which of the following bulbs will have the least resistance?

(a) 220V, 60W (b) 220V, 100W

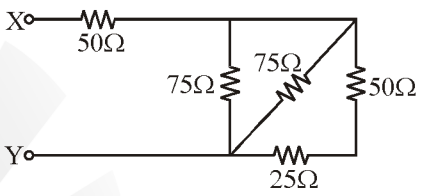
(c) 115V, 60W (d) 115V, 100W

42. A resistance of 5 ohms is further drawn so that its length becomes double. Its resistance will now be.

(a) 5 ohms (b) 7.5 ohms

(c) 10 ohms (d) 20 ohms

43. Equivalent resistance between X and Y is



(a) 75 Ω (b) 50 Ω

(c) 275 Ω (d) None of above

44. Three equal resistors, connected in series across a source of emf, dissipated 10W of power. What would be the power dissipated in the same resistor when they are connected in parallel across the same source?

(a) 10W (b) 30W

(c) 90W (d) 270W

[DMRC JE - 2016]

45. A 10Ω resistor is connected in parallel with a 15Ω resistor and the combination in series with a 12Ω resistor. The equivalent resistance of the circuit is:

(a) 37Ω (b) 27Ω

(c) 18Ω (d) None of these

[DMRC JE - 2016]

46. The energy used by a 1.5kW heater in 5 minutes is:

(a) 450 000 J (b) 450 J

(c) 7500 J (d) None of these

[DMRC JE - 2016]

47. What is called the Electro-Motive Force (EMF) of a voltage source?

(a) Terminal voltage when load is applied

(b) Internal voltage when no load is applied

(c) Product of internal resistance and load current

(d) Electric pressure provided to the load

[DMRC JE - 2016]

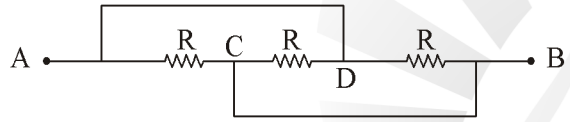
48. One coulomb of electrical charge is contributed by how many electrons?

(a) 0.625×10^{19} (b) 1.6×10^{19}

(c) 10^{19} (d) None of these

[DMRC JE - 2016]

49. Three equal resistors each equal to R ohm are connected as shown in fig. The equivalent resistance between points A and B is:



(a) R (b) 3R

(c) R/3 (d) 2R/3

[DMRC JE - 2016]

50. Two resisters R_1 and R_2 give combined resistance of 6 ohm when in series and 0.83 ohm when in parallel. The resistances R_1 and R_2 are respectively

(a) 3 ohm and 3 ohm

(b) 4 ohm and 2 ohm

(c) 5 ohm and 1 ohm

(d) 4.5 ohm and 1.5 ohm

51. A wire having resistance R_1 is stretched to double its length. The new resistance R_2 is :

(a) R_L (b) $2R_1$

(c) $4R_1$ (d) $\frac{R_1}{2}$

52. How many coulombs of charge move through a filament of a light bulb in 1.3 s If there is 8 A of current through the filament?

(a) 9.3 (b) 10.4

(c) 6.15 (d) None of these

53. What is the current, in amperes, when 0.95 coulombs pass a point in 5 s?

(a) 1.00 (b) 0.19

(c) 4.75 (d) None of these

54. It was found that the current was 60 mA when a circuit with a particular resistance is connected to a 20 V battery. The current has dropped to 30 mA after sometime. How much has the voltage changed?

(a) l0V (b) 20V

(c) OV (d) None of these

55. What is the power consumed by the circuit when a bulb of 60 watts and another of 120 watts are joined in a series?

(a) 180 W (b) 40W

(c) 120 W (d) None of these

56. What is the resistance of a 440 cm long wire of 0.28 cm diameter, with specific resistance 0.56 ohm-cm?

(a) 900 Ω (b) 90 Ω

(c) 9 Ω (d) None of these

57. Three resistors of equal resistance connected in series across a power source together dissipate 15 watts of power. What would be the power dissipated when the same resistors are connected in parallel?

(a) 150W (b) l00W

(c) 135W (d) None of these

58. Which of the following is the unit for measuring specific resistance of a material?

(a) Ohm-meter (b) Ohm

(c) Siemens (d) Ohm/meter

59. It is desired to have a total resistance of 7Ω. There are 3 resistances of values 3Ω, 12Ω and 6Ω available. What will be the combination of these three resistances in order to achieve the required objective of 7Ω?

(a) All the three in series

(b) 3Ω in series with the parallel combination of 12Ω and 6Ω

(c) 6Ω in series with the parallel combination of 12Ω and 3Ω.

(d) None of these

60. There are 3 registers in parallel in a circuit. What happens to the total resistance if one of them is removed?

(a) Total resistance decreases

(b) Total resistance increases

(c) Total resistance will not change

(d) Total resistance will decrease by one-third

61. There are five parallel resistors and a total of 600 mA of current into these resistors. The currents through four of the resistors are 30 mA, 60 mA, 70 mA and 100 mA. What is the current through the fifth resistor?

(a) 260 mA (b) 340 mA

(c) 600 mA (d) None of these

62. Consider a circuit having four parallel branches with a power dissipation of 1.6 W in each. What is the total power dissipation?

(a) 1.6 W (b) 6.4W

(c) 0.4W (d) None of these

63. If two light bulbs that are parallel-connected dissipate 60 watts and 100 watts of power, then what is the total power loss?

(a) 160 W (b) 80 W

(c) 40W (d) None of these

64. The total resistance of circuit with two resisters connected parallel is 6 ohms. What are the individual values of these two parallel resistors when one has 50% more resistance than the resistance of the other?

(a) 10 ohms and 15 ohms

(b) 16 ohms and 24 ohms

(c) 6 ohms and 9 ohms

(d) None of these

65. Which of the following can be a use of a parallel circuit?

(a) Voltage

(b) Current

(c) Magnetic flux

(d) None of these

66. Which of the following can be used to measure the strength of a battery?

(a) Henry (b) Tesla

(c) Volt (d) None of these

67. What is Electrical impedance?

(a) It is the measure of the opposition that a circuit presents to a current when a resistance is added or remove

(b) It is the measure of the opposition that a circuit presents to a current when there is a change in the cycles.

(c) It is the measure of the opposition that a circuit presents to a current when a voltage is applied

(d) None of these.

68. What is the peak-to-peak value when the peak of a sine wave is 13 V?

(a) 26 V (b) 13 V

(c) 260V (d) None of these

69. What is the equivalent negative angle of 30° positive angle?

(a) –30° (b) –330°

(c) 3000 (d) None of these

70. What is the rating of a particular source if it is capable of supplying 8 A for 6 hours?

(a) 1.33 Ah (b) 48 Ah

(c) 0.75 Ah (d) None of these

71. If an oven consumes 500 watts for 25 hours, then the total energy used is

(a) 12.5 kWh (b) 12500 kWh

(c) 12500 mWh (d) None of these

72. A server uses 350 W and is allowed to run continuously for 30 days. What is the amount of kilowatt hours of energy is consumed?

(a) 252,000 kWh (b) 252 kWh

(c) 0.252 kWh (d) None of these

73. In purely resistive circuits, the _____ and the ____ applied are _____ phase with each other.

(a) Current, voltage, out of

(b) Frequency, voltage, in

(c) Frequency, voltage, out of

(d) Current, voltage, in

[UPPCL JE - 2014]

74. Following data is known about a resultant current wave which is made-up of two components:

1. A direct current of 10A
2. A sinusoidal alternating current of 50 Hz with a peak value of 10 A.

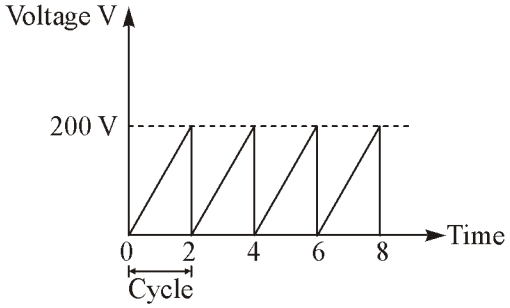
Calculate the r.m.s. value of the resultant wave.

(a) 24.12 A (b) 12.24 A

(c) 1.24 A (d) 2.14 A

[UPPCL JE - 2014]

75. What will be the average value of the sawtooth waveform shown below?



(a) 150 V (b) 100 V

(c) 200 V (d) 250 V

[UPPCL JE - 2014]

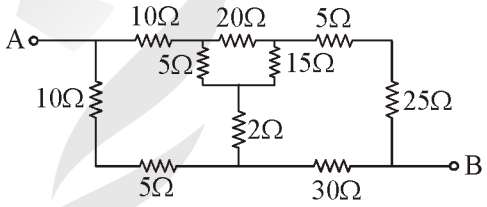
76. It is known that two 2Ω, 2W resistors are connected in parallel. Find the combined resistance and wattage rating.

(a) 2Ω, 4W (b) 1Ω, 4W

(c) 1Ω, 2W (d) 2Ω, 2W

[UPPCL JE - 2014]

77. Consider the following circuit and determine the equivalent resistance between A and B.

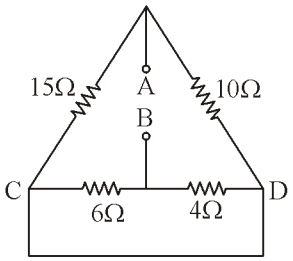


(a) 15.76 Ω (b) 1.63 Ω

(c) 23.52 Ω (d) 2.04 Ω

[UPPCL JE - 2014]

78. In the following circuit, determine the equivalent resistance between points A and B.



(a) 8.4 Ω (b) 4 Ω

(c) 2.5 Ω (d) 6.8 Ω

[UPPCL JE - 2014]

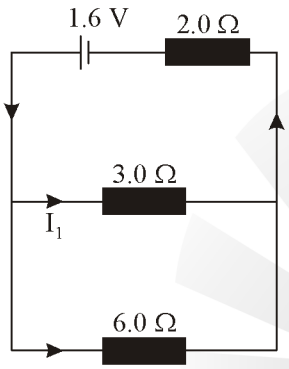
79. If 10 lamps are connected in series across a power supply, then determine the voltage of the supply when it is given that the voltage across each lamp is 6.0 V.

(a) 60 V (b) 20 V

(c) 35 V (d) 42 V

[UPPCL JE - 2014]

80. Consider the following given circuit and find the value of total current drawn from the cell and the potential difference across the 3Ω resistor respectively.



(a) 0.4 A, 0.8 V (b) 0.85 A, 0.6 V

(c) 0.56 A, 0.8 V (d) 0.9 A, 0.8 V

[UPPCL JE - 2014]

81. Current in a circuit is measured using a simple slide wire. What will be the voltage drop per unit length. If the standard cell is of emf 2.38 V balanced at length of 35 cm.

(a) 0.68 V/cm (b) 0.068 V/cm

(c) 68 V/cm (d) 6.8 V/cm

[UPPCL JE - 2014]

82. The element which is capable of delivering energy by its own is known as :

(a) Non-linear element (b) Unilateral element

(c) Active element (d) Passive element

[NMRC JE - 2017]

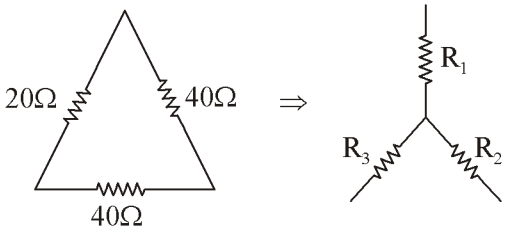
83. _____ remains same in all parts of a series circuit.

(a) Current (b) Resistance

(c) Voltage (d) Power

[NMRC - JE-2017]

84. Convert the Delta network into equivalent Star network:



(a) $R_1 = 8\Omega, R_2 = 8\Omega, R_3 = 8\Omega$

(b) $R_1 = 8\Omega, R_2 = 16\Omega, R_3 = 16\Omega$

(c) $R_1 = 8\Omega, R_2 = 8\Omega, R_3 = 16\Omega$

(d) $R_1 = 8\Omega, R_2 = 16\Omega, R_3 = 8\Omega$

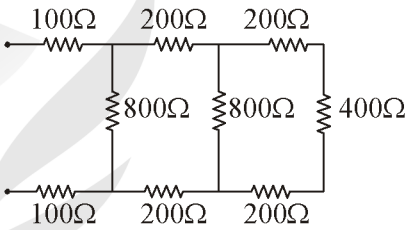
[NMRC JE - 2017]

85. Unit of reactive power is:

(a) Watt (b) Kilo Watt

(c) VAR (d) Volt Ampere

86. The equivalent resistance of the given circuit is:



(a) 200 Ω (b) 400 Ω

(c) 600 Ω (d) 1600 Ω

87. With the increase in the cross sectional area of the conductor, the value of resistance:

(a) Increase (b) Remain same

(c) Decrease (d) None of these

88. To neglect a current source, the terminal across the sources are:

(a) Open-circuited

(b) Short-circuited

(c) Replaced by some resistance

(d) Replaced by capacitance

89. An electric current is the

(a) Random movement of electrons in a conductor

(b) Movement of free electrons predominately in one direction

(c) Pressure difference between two poles

(d) The power that causes drift of electrons

90. A current is said to be alternating when it changes in

(a) Magnitude only

(b) Direction only

(c) Both magnitude and direction

(d) None

91. Which of the following material has least specific Resistance

(a) Copper (b) Silver

(c) Aluminum (d) Iron

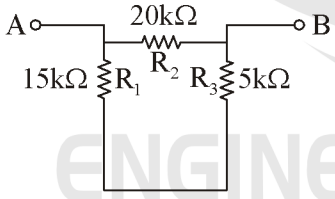
92. Resistivity of a wire depends upon

(a) Material (b) Area

(c) Length (d) All of these

[UPPCL JE - 2007]

93. In the following figure, the resistance measured across A and B will be



(a) 5 kΩ (b) 10 kΩ

(c) 15kΩ (d) 20 kΩ

[UPPCL JE - 2007]

94. A charge of 0.1 coulomb moves through a given point in every 0.05 seconds. The current flowing through the point is

(a) 2 mA (b) 5 mA

(c) 2 A (d) 5 A

[UPPCL JE - 2007]

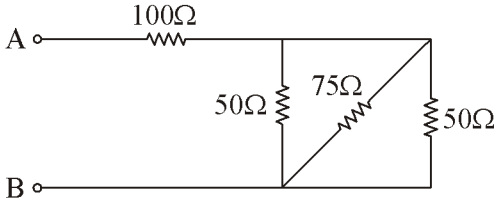
95. A 220 V, 200 W bulb and a 220 V, 100 W bulb are connected in series across a 220 V supply, the power consumed by them will be

(a) 33.3 W (b) 66.6 W

(c) 100 W (d) 300 W

[UPPCL JE - 2007]

96. In the following figure, the equivalent resistance at terminals A and B will be



(a) 275 Ω (b) 180 Ω

(c) 118.75 Ω (d) None of these

[UPPCL JE - 2007]

97. A 2.2 m long conductor has a cross sectional area of 0.025 m^2 and resistance of 5 ohms, find its resistivity.

(a) 0.072 ohm m (b) 0.057 ohm m

(c) 0.58 ohm m (d) 0.67 ohm m

[UPPCL JE - 2016]

98. Power dissipated in a pure capacitor is

(a) Equals to I^2R

(b) Minimum

(c) Zero

(d) Equals to heat loss

[UPPCL AE - 2016]

99. What will be the largest number of 100 W electric light bulbs which can be operated from a 200V supply fitted with a 13A fuse?

(a) 16 (b) 26

(c) 31 (d) 32

[UPPCL AE - 2016]

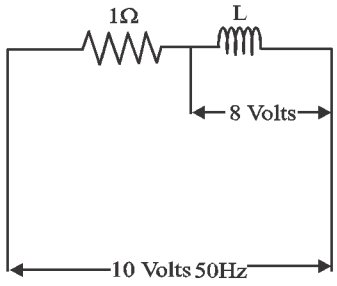
100. _____ is the property of conductor which is opposite to the property that opposes flow of current.

(a) Conductance (b) Resistance

(c) Reluctance (d) Inductance

[UPPCL AE - 2016]

571. For the circuit given below, the current through 1Ω resistor will be.



(a) 2 amps (b) 4 amps
(c) 6 amps (d) 8 amps

[APSPDCL-2012]

572. An ideal voltage source will charge an ideal capacitor.

(a) In infinite time (b) Exponentially
(c) Instantaneously (d) Linearly

[HMWS-2012]

573. A current input 5u(t), is forced through a capacitor C. The voltage $V_C(t)$, across the capacitor is given by :

(a) 5t (b) 5u(t). C
(c) $\frac{5}{C}t$ (d) $\frac{5}{C}u(t)$

[HMWS-2012]

574. The nodal analysis is primarily based on the application of:

(a) Ohm's law
(b) Kirchhoff's current law
(c) Kirchhoff's voltage law
(d) Both (a) and (b)

[HMWS-2012]

575. A voltage waveform $v(t) = 12\ t^2$ is applied across a 1 H inductor for $t > 0$, with initial current through it being zero. The current through the inductor for $t > 0$ is given by:

(a) 12t (b) 24t
(c) $12t^3$ (d) $4t^3$

[TRANSCO-AE-2012]

576. Assuming ideal elements in the circuit shown below, the voltage V_{ab} will be.

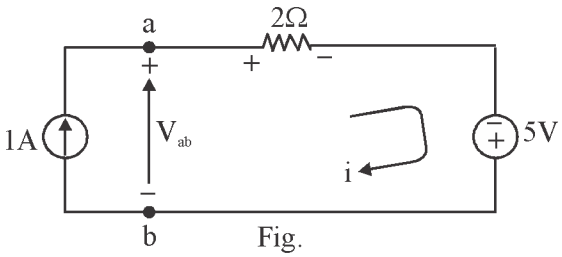
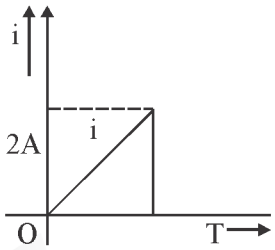


Fig.

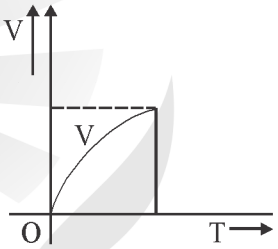
(a) –3 V (b) 0 V
(c) 3 V (d) 5 V

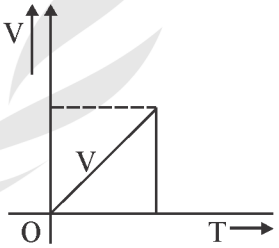
[TRANSCO-AE-2012]

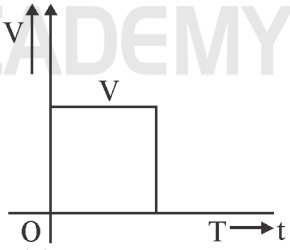
577. The wave shape of current flowing through an inductor is.

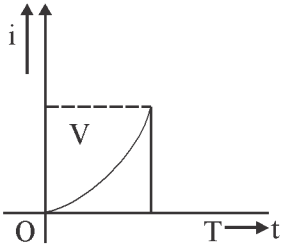


The wave shape of voltage drop (v) across the inductor is.

(a)


(b)


(c)


(d)


[TRANSCO-AE-2012]

578. Two wires A and B of the same material but of different lengths L and 2L have the radius r and 2r respectively. The ratio of specific resistance will be.

(a) 1 : 8 (b) 1 : 1

(c) 1 : 2 (d) 1 : 4

[SSC-JE-2012]

579. A 20 micro Faraday capacitor is connected across an ideal voltage source. The current in the capacitor.

(a) None of the these true

(b) Will be zero at first, then exponentially rise.

(c) Will be very high at first, then exponentially decay.

(d) Will be very high at first, then exponentially decay and at steady state will become zero.

[SSC-JE-2012]

580. In an R–L series circuit R = 20Ω, L, = 0.056 H and the supply frequency is f = 50 Hz. The magnitude of impedance of the circuit is.

(a) 20.00 Ω (b) 37.6 Ω

(c) 20.056 Ω (d) 26.64 Ω

[SSC-JE-2012]

581. The mutual inductance between two closely coupled coils is 1H. If the turns of one coil is decreased to half and those of the other is doubled, the new value of the mutual inductance would be.

(a) 1 H (b) 2 H

(c) 1/2 H (d) 1/4 H

[SSC-JE-2012]

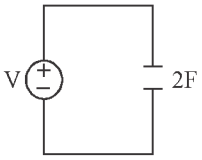
582. Resistance temperature coefficient of copper at 20°C is.

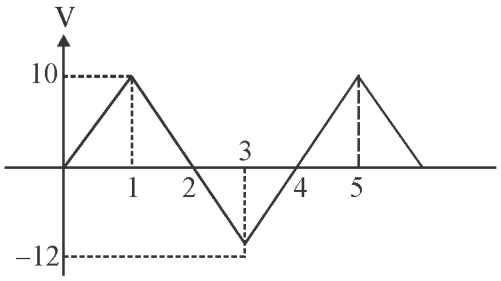
(a) 0.0045 /°C (b) 0.0017 /°C

(c) 0.00393 /°C (d) 0.0038 /°C

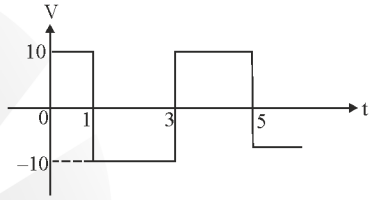
[SSC-JE-2013]

583. In the circuit, V is the input voltage applied across the capacitor of 2F. Current through the capacitor is:

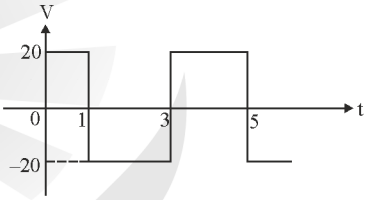




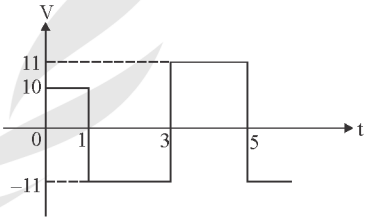
(a)



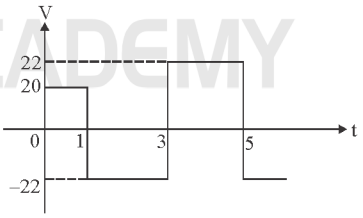
(b)



(c)



(d)



[SSC-JE-2013]

584. A geyser is operated from 230V, 50 c/s mains. The frequency of instantaneous power consumed by the geyser is.

(a) 25 c/s (b) 50 c/s

(c) 100 c/s (d) 150 c/s

[SSC-JE-2013]

585. Three equal impedances are first connected delta across a 3–phase balanced supply. If the same impedances are connected in star across the same supply.

(a) Phase currents will be 1/3 of the previous value.

(b) Line currents will be 1/3 of the previous value

(c) Power consumed will be 1/3 of the previous value

(d) Power consumed will be 3 times of the previous volume.

[SSC-JE-2013]

586. A current from an ac source bifurcates into two branches A and B in parallel. Branch A is an inductor with 30μH inductance and 1Ω resistance. Branch B is another inductor with inductance L and 1.5Ω resistance. For the ratio of currents in the branches to be independent of supply frequency, value of L should be.

(a) 30.5 μH (b) 20 μH

(c) 45 μH (d) 29.5 μH

[SSC-JE-2013]

587. Which one of the following is a valid value of coefficient of coupling between two inductors?

(a) 1.414 (b) 0.9

(c) 1.732 (d) 17.32

[SSC-JE-2013]

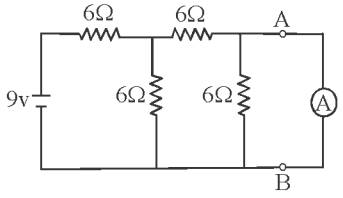
588. Two coupled coils, connected in series, have an equivalent inductance of 16mH or 8 mH depending on the connection. The mutual inductance between the coils is.

(a) 12 mH (b) $8\sqrt{2}$ mH

(c) 4 mH (d) 2 mH

[SSC-JE-2013]

589. An ideal ammeter is connected between terminals A and B. The reading of the ammeter is.

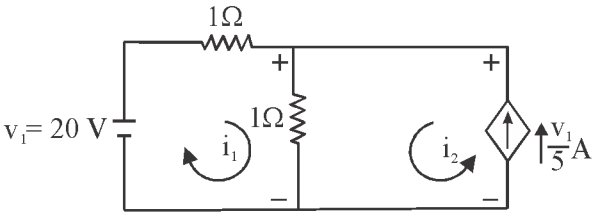


(a) 0.8A (b) 1 A

(c) 0.5 A (d) 0.6 A

[EPDCL-2014]

590. In the circuit shown, the dependent source.



(a) Delivers 24W (b) Delivers 48W

(c) Absorbs 48W (d) Absorbs 24W

[EPDCL-2014]

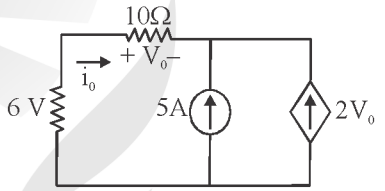
591. Which of the following quantities if dimensionally different from the other three?

(a) $\frac{L}{R}$ (b) RC

(c) $\frac{\omega L}{R}$ (d) $\frac{2\pi}{\omega}$

[APSPDCL-2014]

592. The dependent source in the circuit shown is classified as.



(a) VCCS (b) VCVS

(c) CCCS (d) CCVS

[APSPDCL-2014]

593. Which of the following functions is not an even function?

(a) t^2 (b) t^4

(c) sint (d) cost

[APSPDCL-2014]

594. A saw tooth wave form has a period of T and a maximum value of Y_m. The rms value of the wave is.

(a) $\frac{Y_m}{2}$ (b) $\frac{Y_m}{\sqrt{3}}$

(c) $\frac{Y_m}{\pi}$ (d) $\frac{2Y_m}{\pi}$

[APSPDCL-2014]

595. Read the statements P and Q and pick up correct option.

P : An inductor acts like a short circuit to DC.

Q : The current through a capacitor cannot change abruptly.

(a) Both the statements P and Q are correct

(b) Neither of the statements is correct.

(c) Only statement P is correct.

(d) Only statement Q is correct.

[APSPDCL-2014]

596. In highly inductive circuit, a small capacitance is added in series. Then the angle between applied voltage and resultant current will be.

(a) Increase

(b) Decrease

(c) Remains absolutely unaltered

(d) Alter insignificantly

[ISRO-2014]

597. Which of the following is non linear circuit parameter?

(a) Inductance

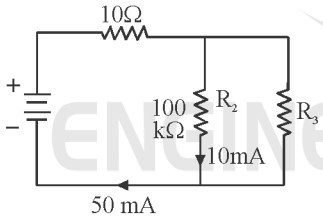
(b) Condenser

(c) Wire wound resistor

(d) Transistor

[SSC-JE 2014]

598. Find R_3 for the circuit shown in figure.



(a) 25 milli Ω (b) 25Ω

(c) 25 kilo Ω (d) 25 mega Ω

[SSC-JE-S1-2014]

599. A 2 cm long coil has 10 turns and carries a current of 750mA. The magnetizing force of the coil is:

(a) 225 AT/m (b) 675 AT/m

(c) 450 AT/m (d) 375 AT/m

[SSC-JE 2014]

600. A magnetic circuit carries a flux ϕ_i in the iron part and a flux ϕ_g in the air gap. Then leakage coefficient is:

(a) $\frac{\phi_i}{\phi_g}$ (b) $\frac{\phi_g}{\phi_i}$

(c) $\phi_g \times \phi_i$ (d) $\phi_i - \phi_g$

[SSC-JE-2014]

601. The voltage across 5-H inductor is :

$$V(t) = \begin{cases} 30t^2, t > 0 \\ 0, t < 0 \end{cases}$$

Find the energy stored at t = 5s. Assume zero initial current.

(a) 0.625 kJ (b) 3.125 kJ

(c) 156.25 kJ (d) 312.5 kJ

[SSC-JE-2014]

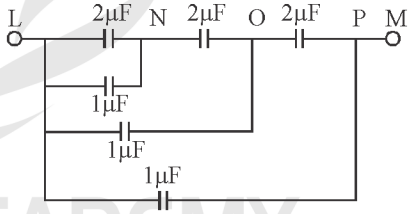
602. Two wires A and B have the same cross-section and are made of the same material. $R_A = 800\Omega$ and $R_B = 100\ \Omega$. The number of times A is longer than B is:

(a) 6 (b) 2

(c) 8 (d) 5

[SSC-JE-2014]

603. Total capacitance between the points L and M in figure is:



(a) 1.45 μF (b) 1.85 μF

(c) 2.05 μF (d) 4.05 μF

[SSC-JE-2014]

604. A coil with a certain number of turns has a specified time constant. If the number of turns is doubled, its time constant would.

(a) Remain unaffected

(b) Become double

(c) Become four-fold

(d) Get halved

[SSC-JE-2014]

605. The flux through each turn of a 100–turn coil is (t^3-2t)m Wb, where 't' is in seconds. Find the magnitude of the induced emf at t = 2s.

(a) 1 V (b) 0.8 V

(c) 0.4 V (d) 0.2 V

[SSC-JE-2014]

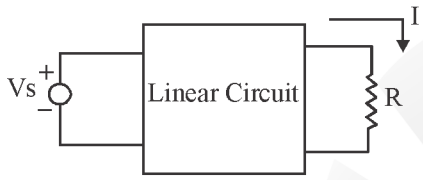
606. For the linear circuit shown in figure,

when R = ∞, V = 20 V;

when R = 0, I = 4 A;

when R = 5Ω,

The current I is.

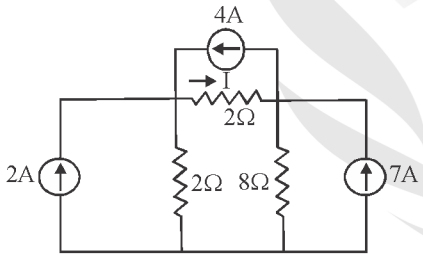


(a) 1 A (b) 2 A

(c) 3 A (d) 4 A

[SSC-JE--2014]

607. The current I in the circuit shown in the figure is.



(a) –3.67 A (b) –1 A

(c) 4 A (d) 6 A

[SSC-JE-2014]

608. The material to be used in the manufacture of a standard resistor should be of:–

(a) Low resistivity

(b) High resistivity and low temperature coefficient.

(c) High temperature coefficient

(d) Low resistivity and high temperature coefficient.

[SSC-JE 2014]

609. A 200 W, 200 V build and a 100W, 200V bulb are connected in series and the voltage of 400V is applied across the series connected bulbs. Under this condition.

(a) 100 W bulb will be brighter than 200W bulb.

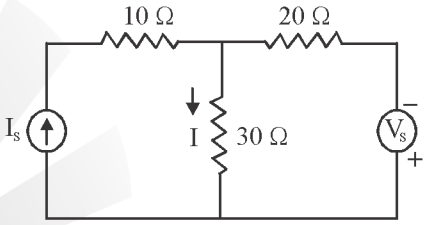
(b) 200 W bulb will be brighter than 100W bulb.

(c) Both the bulb will have equal brightness.

(d) Both the bulb will be darker than when they are connected across rated voltage.

[SSC-JE-2014]

610. For the circuit show in figure, when V_s = 0, I = 3A. When V_s = 200 V. What will be the value of I?



(a) –4 A (b) –1 A

(c) 1 A (d) 7 A

611. The phase angle between the inductor current and the applied voltage is:

(a) 45° (b) 0°

(c) 180° (d) 90°

[HMWS-2015]

612. _____is the unit of electric dipole moment.

(a) m/ coulomb (b) Coulomb –m

(c) Coulomb/m² (d) Coulomb / m

[HMWS-2015]

613. If the electrical susceptibility of a particular material is 'Y', then its.

(a) Relative permittivity is Y – 1

(b) Relative permeability is Y – 1

(c) Relative permittivity is Y +1

(d) None of the above

[HMWS-2015]

614. The best material use for standard resistor is.

(a) Platinum (b) Aluminium

(c) Nichrome (d) Manganin

[HMWS-2015]

615. A network contains linear resistors and ideal voltage sources. If values of all the resistors are doubled, then the voltage across each resistor is.

(a) Become half

(b) Become double

(c) Increase by four times

(d) Not change

[TGENCO -2015]

616. A battery consists of 'n' series connected cells while voltage of each cell is 'v' volts and capacity 'k'. The voltage and capacity of battery is.

(a) Voltage of battery = n * v, Capacity of battery = Capacity of each cell

(b) Voltage of battery = n * v, capacity of battery = n* capacity of each cell.

(c) Voltage of battery = v, capacity of battery = n* Capacity of each cell.

(d) Voltage of battery = v, Capacity of battery = Capacity of each cell.

[TGENCO -2015]

617. In a pure resistive circuit the average power P_{avg} is _____ the peak power P_{max}

(a) Double (b) One half of

(c) One-fourth (d) Equal to

[TSTRANSCO -2015]

618. Four parallel resistors connected in parallel with five series resistors are connected to a dc supply of 210V. If 'R' is resistance of each resistor and supply current is 5A, then the value of 'R' is.

(a) 42 Ω (b) 441/25 Ω

(c) 10 Ω (d) 882/5 Ω

[TSSPDCL -2015]

619. Choose the instantaneous reactive power of a pure capacitive 1–ϕ ac circuit, if V_m, I_m and f are peak voltage, peak current and frequency of sinusoidal supply.

(a) $0.5V_mI_m \sin 4\pi ft$

(b) $-0.5V_mI_m \sin 2\pi ft$

(c) $-0.5V_mI_m \sin 4\pi ft$

(d) $0.5V_mI_m \sin 2\pi ft$

[TSSPDCL -2015]

❑❑❑

ANSWERS AND EXPLANATIONS

1. ***Ans. (a)***

$$R_1 = \frac{R_{ac} \times R_{ab}}{R_{ab} + R_{bc} + R_{ca}}$$

$$= \frac{15 \times 5}{15 + 5 + 30}$$

$$R_1 = \frac{75}{50} = 1.5\Omega$$

$$R_2 = \frac{150}{50} = 3\ \Omega$$

and $$R_3 = \frac{450}{50} = 9\Omega$$

2. ***Ans. (d)***

3. ***Ans. (d)***

$$L \propto N^2$$

$$\therefore \quad N = 2000\sqrt{\frac{5}{3}} = 2582$$

Added number of turns = 582

4. ***Ans. (b)***

(b – n + 1) links associated with fundamental loops.

So, b – n + 1 = 10 – 7 + 1 = 4.

5. ***Ans. (c)***

For maximum i(t)

$$\frac{di(t)}{dt} = 0 = e^{-\alpha t}(1 - \alpha t) = 0$$

$$\Rightarrow \quad t = \frac{1}{\alpha}$$

6. ***Ans. (c)***

Using Y-Δ conversion

$$R_{eff} = \frac{\frac{3}{4}R \times \frac{3}{2}R}{\frac{3}{4}R + \frac{3}{2}R} = \frac{R}{2}$$

7. ***Ans. (c)***

8. ***Ans. (a)***

9. ***Ans. (d)***

10. ***Ans. (a)***

11. ***Ans. (c)***

12. ***Ans. (a)***

13. ***Ans. (b)***

14. ***Ans. (a)***

Total power in parallel circuit

= 40 + 40 = 80 W

15. ***Ans. (d)***

16. ***Ans. (b)***

17. ***Ans. (c)***

18. ***Ans. (a)***

19. ***Ans. (d)***

20. ***Ans. (b)***

21. ***Ans. (c)***

22. ***Ans. (a)***

23. ***Ans. (a)***

24. ***Ans. (c)***

25. ***Ans. (b)***

26. ***Ans. (b)***

27. ***Ans. (d)***

28. ***Ans. (c)***

29. ***Ans. (d)***

30. ***Ans. (d)***

31. ***Ans. (b)***

32. ***Ans. (b)***

33. ***Ans. (b)***

34. ***Ans. (b)***

35. ***Ans. (b)***

36. ***Ans. (c)***

37. ***Ans. (b)***

38. ***Ans. (b)***

39. ***Ans. (b)***

40. ***Ans. (c)***

41. ***Ans. (d)***

42. ***Ans. (d)***

43. ***Ans. (a)***

44. ***Ans. (c)***

$$P_{series} = \frac{V^2}{3R} = 10\ W$$

$$= \frac{V^2}{R} = 30\ W$$

$$P_{parallel} = \frac{3V^2}{R}$$

$$= 3 \times 30 = 90W$$

45. ***Ans. (c)***

$$R_{eq1} = \frac{10 \times 15}{10 + 15} = 6\Omega$$

$$R_{eq} = 12 + 6\Omega = 18\Omega$$

46. ***Ans. (a)***

$$1kwh = 36 \times 10^5 \text{ Joule}$$

$$\text{Total kwh} = 1.5 \times \frac{5}{60}$$

$$= 0.125$$

$$\text{Joule} = 0.125 \times 36 \times 10^5$$

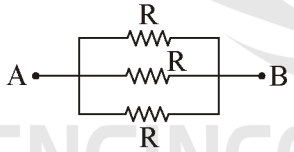
$$\text{Energy} = 450000\ J$$

47. ***Ans. (b)***

48. ***Ans. (a)***

49. ***Ans. (c)***

Redraw the circuit



$$R_{eq} = R \parallel R \parallel R$$

$$= \frac{R}{3}$$

50. ***Ans. (c)***

$$R_{series} = R_1 + R_2$$

$$= 5 + 1 = 6\Omega$$

$$R_{parallel} = \frac{R_1 R_2}{R_1 + R_2}$$

$$= \frac{5 \times 1}{5 + 1} = 0.83$$

51. ***Ans. (c)***

$$R = \frac{\rho l}{a};\ R_1 = \rho \frac{(2l)}{(a/2)}$$

$$R_1 = 4R$$

52. ***Ans. (b)***

$$\frac{dQ}{dt} = 8A$$

$$dQ = 8 \times 1.3$$

$$dQ = 10.4 \text{ coulombs}$$

53. ***Ans. (b)***

$$I = \frac{dQ}{dt} = \frac{0.95}{5}$$

$$I = 0.19\ A$$

54. ***Ans. (a)***

$$R = \frac{V}{I} = \frac{20}{60} \times 10^3$$

$$= 333.33\ \Omega$$

$$V = IR$$

$$= 30 \times 10^{-3} \times \frac{20}{60} \times 10^3$$

$$= 10\ V$$

55. ***Ans. (b)***

$$P = \frac{P_1 \times P_2}{P_1 + P_2}$$

$$= \frac{60 \times 120}{180}$$

$$= 40\ W$$

56. ***Ans. (d)***

Given $\rho = 0.56$ ohm-em

$l = 440$ cm

$$a = \frac{\pi \times 0.28 \times 0.28\ cm^2}{4}$$

Resistance $R = \frac{\rho l}{a}$

$$= \frac{0.56 \times 440}{\frac{(\pi \times 0.28 \times 0.28)}{4}}$$

$\Rightarrow$ $R = 4000\ \Omega$

57. ***Ans. (c)***

Connected in series

$$\Rightarrow \quad \frac{V^2}{3R} = 15$$

$$\frac{V^2}{R} = 45$$

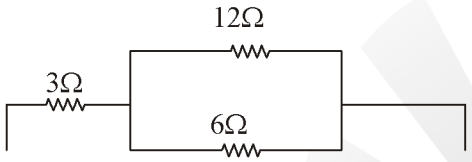
Connected in parallel

$$\frac{3V^2}{R} = 3 \times 45$$

$$= 135 \text{ W}$$

58. ***Ans. (a)***

59. ***Ans. (b)***



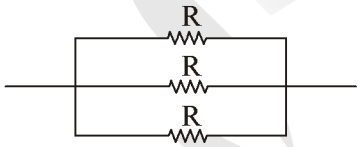
$$R_{eq} = 3 + (6 \parallel 12)$$

$$= 3 + \frac{6 \times 12}{12 + 6}$$

$$R_{eq} = 7\Omega$$

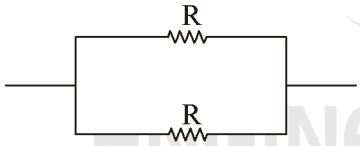
60. ***Ans. (b)***

(a)



$$R_a = R \parallel R \parallel R = R/3$$

(b)



$$R_b = R \parallel R = R/2$$

$$\Rightarrow \quad R_b > R_a$$

61. ***Ans. (b)***

$$I_T = I_1 + I_2 + I_3 + I_4 + I_5$$

$$I_5 = 600 - 260 = 340 \text{ mA}$$

62. ***Ans. (b)***

Power is additive in any configuration of resistive circuit

$$P_T = 1.6 + 1.6 + 1.6 + 1.6$$

$$= 6.4 \text{ W}$$

63. ***Ans. (a)***

Total Power Loss = 100 + 60 = 160 W

64. ***Ans. (a)***

Let the two resistors are R and 1.5 R

$$\frac{R \times 1.5R}{2.5R} = 6$$

$$R = 10\ \Omega$$

Second resistor is $1.5 \times 10 = 15\ \Omega$

65. ***Ans. (a)***

66. ***Ans. (c)***

67. ***Ans. (c)***

68. ***Ans. (a)***

$$V_{PP} = 2V_{max}$$

$$= 2 \times 13V = 26V$$

69. ***Ans. (b)***

70. ***Ans. (b)***

Rating in Amp-hour = 8A × 6h = 48 Ah

71. ***Ans. (a)***

$$\text{kWh} = 500 \times 25 \times 10^{-3}$$

$$= 12.5 \text{ kW}$$

72. ***Ans. (b)***

$$\text{kWh} = 350 \times 30 \times 24$$

$$= 252 \text{ kWh}$$

73. ***Ans. (d)***

74. ***Ans. (b)***

$$I_{rms} = \sqrt{10^2 + \left(\frac{10}{\sqrt{2}}\right)^2}$$

$$I_{rms} = 12.24 \text{ A}$$

75. ***Ans. (b)***

$$\text{Average Value} = \frac{V_m}{2}$$

$$= \frac{200}{2} = 100 \text{ V}$$

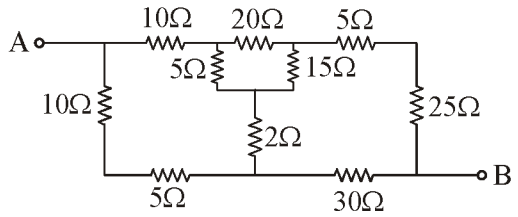
76. ***Ans. (b)***

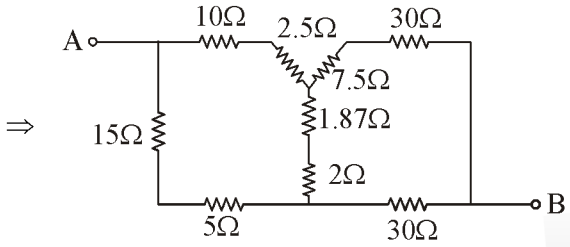
$$R_{eq} = \frac{2 \times 2}{2 + 2} = 1\Omega$$

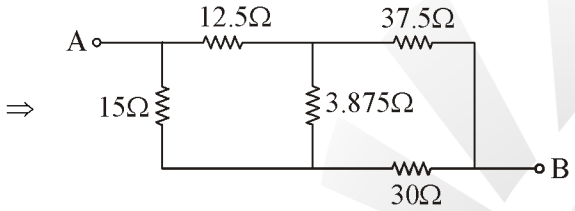
Wattage rating is additive in parallel resistance network.

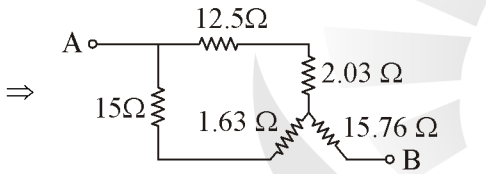
$\therefore$ 2W + 2W = 4W

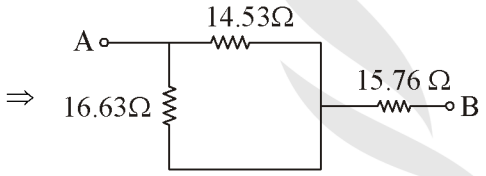
77. ***Ans. (b)***







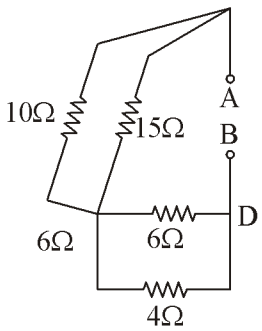




$$R_{AB} = \frac{14.53 \times 16.63}{14.53 + 16.63} + 15.76$$

$$= 23.53\ \Omega$$

78. ***Ans. (a)***



$$R_{AB} = 6 + 2.4$$

$$= 8.4\ \Omega$$

79. ***Ans. (a)***

Since lamps are connected in series and voltage across each lamp = 6.0 V

$\therefore$ Voltage of supply $(V_S) = 10 \times 6 = 60$ V

80. ***Ans. (a)***

Total resistance $(R_{eq}) = 3 \parallel 6 + 2$

$$= \frac{3 \times 6}{6 + 3} + 2$$

$$= 4\Omega$$

Total current drawn from the cell

$$= \frac{1.6}{4} = 0.4 \text{ A}$$

$$I_1 = \frac{6}{3 + 6} \times 0.4 = 0.267 \text{ A}$$

$$V_{3\Omega} = 0.267 \times 3 = 0.8 \text{ V}$$

81. ***Ans. (b)***

Voltage drop per unit length

$$= \frac{2.38}{35} = 0.068 \ \frac{\text{V}}{\text{cm}}$$

82. ***Ans. (c)***

When the element is having property of internal amplification then element is called as active element.

83. ***Ans. (a)***

84. ***Ans. (d)***

$$R_1 = \frac{20 \times 40}{20 + 40 + 40} = 8\Omega$$

$$R_2 = \frac{40 \times 40}{20 + 40 + 40} = 16\Omega$$

$$R_3 = \frac{20 \times 40}{20 + 40 + 40} = 8\Omega$$

85. ***Ans. (c)***

601. *Ans. (c)*

$$\text{Voltage } V(t) = \begin{cases} 30t^2, & t > 0 \\ 0, & t < 0 \end{cases}$$

$$i = \frac{1}{L}\int V(t)dt = \frac{1}{L}\int 30\, t^2 dt$$

$$= \frac{1}{L}.30.\frac{t^3}{3} \text{ at } 5 \text{ sec}$$

$$= \frac{1}{5} \times 30 \times \frac{5^3}{3} = 250 \text{ A}$$

$$\text{Energy} = \frac{1}{2}Li^2$$

$$= \frac{1}{2} \times 5 \times 250^2$$

$$= 156.25 \text{ kJ}$$

602. *Ans. (c)*

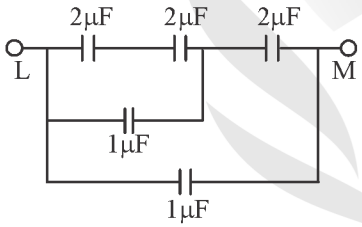
$$R \propto l$$

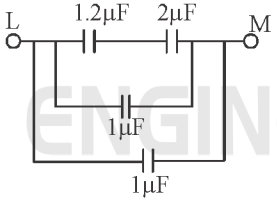
$$\frac{R_A}{R_B} = \frac{\ell_A}{\ell_B}$$

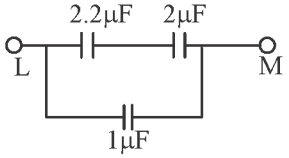
$$\Rightarrow \quad l_A = 8l_B$$

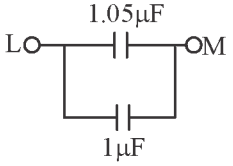
603. *Ans. (c)*

Given circuit is converted to.









$$\Rightarrow \quad C_{eq.} = 2.05 \text{ μF}$$

604. *Ans. (b)*

$$\text{Time constant} = \frac{L}{R}$$

$$L \propto N^2 \Rightarrow L_2 = 4L_1$$

$$R \propto N \Rightarrow R_2 = 2R_1$$

$\therefore$ New time constant

$$= \frac{4L_1}{2R_1} = 2.\tau$$

605. *Ans. (a)*

$$\text{Induced emf (in magnitude)} = \frac{Nd\phi}{dt}$$

$$= (100)(3t^2 - 2) \times 10^{-3}$$

$$= 100(12 - 2) \times 10^{-3} = 1 \text{ V}$$

606. *Ans. (b)*

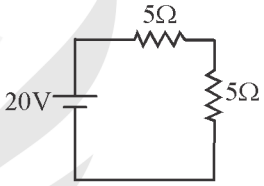
Given, $V_{th} = 20$ V

$I_{SC} = 4$ A

$R_{th} = 5\ \Omega$

Cicuited is represented as,

$$I = \frac{20}{10} = 2 \text{ A}$$



607. *Ans. (b)*

Apply KVL

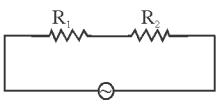
$(6 - I)2 - (3 + I)8 - 2I = 0$

$-12I + 12 - 24 = 0$

$\Rightarrow \quad I = -1$ A

608. *Ans. (b)*

609. *Ans. (a)*



$$R_1 = \frac{(200)^2}{200} = 200\ \Omega$$

$$R_2 = \frac{(200)^2}{100} = 400\ \Omega$$

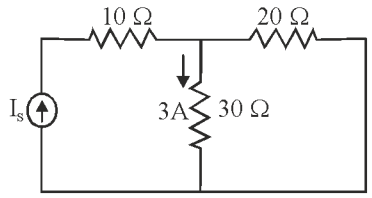
$R_2 > R_1$

So more voltage across R_2 measured.

So 100 W bulb will be brighter than 200 W bulb.

610. ***Ans. (b)***

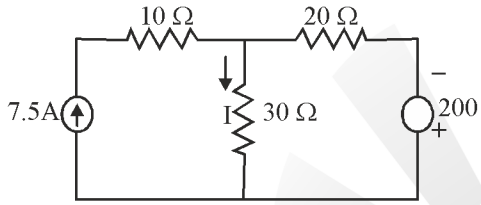
When, $V_s = 0$ circuit becomes.



$$\therefore \quad i_{20} = \frac{30\times 3}{20} = 4.5 \text{ A}$$

$$\therefore \quad I_S = 7.5 \text{ A}$$

When, $V_S = 200$ V



$$7.5 = \frac{V}{30} + \frac{V+200}{20}$$

$$\Rightarrow \quad -2.5 = V\left(\frac{50}{600}\right)$$

$$\Rightarrow \quad V = -30 \text{ V}$$

$$I = \frac{-30}{30} = -1 \text{ A}$$

611. ***Ans. (d)***

In Inductor, $I_L = \frac{V}{j\omega L}$

$$I_L = \frac{V}{j\omega L} \angle -90^\circ$$

$\therefore$ The angle between V and $I_L = 90^\circ$.

612. ***Ans. (b)***

$$m = Q \times d$$

$$m = \text{Coulomb} - m$$

613. ***Ans. (c)***

The electrical susceptibility χ_m is represented as.

$$\chi_m = \varepsilon_r - 1$$

$$\varepsilon_r = \chi_m + 1$$

614. ***Ans. (d)***

The best material used for standard resistor is manganin.

615. ***Ans. (d)***

If value of resistor is doubled, current through it gets halved and hence voltage across it is not changed.

616. ***Ans. (a)***

With cells in series, current must be same as that in a single cell. Hence capacity is same as that of single cell, K.

617. ***Ans. (b)***

Average power

$$p_{avg} = V_{rms}\, I_{rms}$$

$$= \frac{V_m I_m}{2} = \frac{\text{Peak power}}{2}$$

618. ***Ans. (d)***

$$R_{total} = \frac{V}{I} = \frac{210}{5} = 42\ \Omega$$

$$42 = \frac{5R \times \frac{R}{4}}{5R + \frac{R}{4}}$$

$$= 42 \times \left(\frac{200+R}{4}\right) = \frac{5R^2}{4}$$

$$42 \times 21 = 5R$$

$$\Rightarrow \quad \frac{882}{5} = R$$

619. ***Ans. (a), (c)***

$$V = V_m \sin\omega t$$

$$I = I_m \cos\omega t$$

$$P = \frac{V_m I_m}{2} \sin 2\omega t$$

$$= 0.5 V_m I_m \sin 4\pi ft$$

If rective power received by capacitor is treated as +ve, we get option (a).

If rective power delivered by capacitor is treated as –ve, we get option (c).

❑❑❑