1. Resistivity of a wire depends on

(A) length

(B) material

(C) cross section area

(D) none of the above.

2. When n resistances each of value r are connected in parallel, then resultant resistance is x. When these n resistances are connected in series, total resistance is

(A) nx

(B) rnx

(C) x / n

(D) n^2 x.

3. Resistance of a wire is r ohms. The wire is stretched to double its length, then its resistance in ohms is

(A) r / 2

(B) 4 r

(C) 2 r

(D) r / 4.

4. Kirchhoff's second law is based on law of conservation of

(A) charge

(B) energy

(C) momentum

(D) mass.

5. The diameter of the nucleus of an atom is of the order of

(A) 10^{-31} m

(B) 10^{-25} m

(C) 10^{-21} m

(D) 10^{-14}m.

6. The mass of proton is roughly how many times the mass of an electron?

(A) 184,000

(B) 184,00

(C) 1840

(D)184.

7. The charge on an electron is known to be 1.6×10^{-19} coulomb. In a circuit the current flowing is 1 A. How many electrons will be flowing through the circuit in a second?

(A) 1.6×10^{19}

(B) 1.6×10^{-19}

(C) 0.625×10^{19}

(D) 0.625×10^{12}.

8. Two bulbs marked 200 watt-250 volts and 100 watt-250 volts are joined in series to 250 volts supply. Power consumed in circuit is

(A) 33 watt

(B) 67 watt

(C) 100 watt

(D) 300 watt.

9. Ampere second could be the unit of

(A) power

(B) conductance

(C) energy

(D) charge.

10. Which of the following is not the same as watt?

(A) joule/sec

(B) amperes/volt

(C) amperes x volts

(D) (amperes $)^2$ x ohm.

11. One kilowatt hour of electrical energy is the same as

(A) 36 x 10^5 watts

(B) 36 x 10^8 ergs

(C) 36 x 10^5 joules

(D) 36 x 10^5 B.T.U.

12. An electric current of 5 A is same as

(A) 5 J / C

(B) 5 V / C

(C) 5 C / sec

(D) 5 w / sec.

13. An electron of mass m kg and having a charge of e coulombs travels from rest through a potential difference of V volts. Its kinetic energy will be (A) eV Joules

(B) meV Joules

(C)me / V Joules

(D)V / me Joules.

14. The value of the following is given by 100 (kilo ampere) x (micro ampere) 100 milli ampere * 10 ampere

(A) 0.001 A

(B) 0.1 A

(C) 1 A

(D) 10A.

15. A circuit contains two un-equal resistances in parallel

(A) current is same in both

(B) large current flows in larger resistor

(C) potential difference across each is same

(D) smaller resistance has smaller conductance.

Answers:

1.B 2.D 3.B 4.B 5.D 6.C 7.C 8.B 9.D 10.B 11.C 12.C 13.A 14.B 15.C

16.Conductance is expressed in terms of

(A) ohm / m

(B) m / ohm

(C) mho / m

(D) mho.

17. Which of the following could be the value of resistivity of copper?

(A) 1.7×10^{-8} ohm-cm

(B). 1.7×10^{-6} ohm-cm

(C). 1.6×10^{-5} ohm-cm

(D). 1.7×10^{-4} ohm-cm

18. A copper wire of length l and diameter d has potential difference V applied at its two ends. The drift velocity is v_d. If the diameter of wire is made d/3, then drift velocity becomes

(A) 9 v_d

(B) $v_d / 9$

(C) $v_d / 3$

(D) v_{d^-}

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

(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.

20. We have three resistances of values 2 Ω, 3 Ω and 6 Ω. Which of the following combination will give an effective resistance of 4 Ω?

(A) All the three resistances in parallel

(B) 2 Ω resistance in series with parallel combination of 3 Ω and 6 Ω resistance

(C) 3 Ω resistance in series with parallel combination of 2 Ω and 6 Ω resistance

(D) 6 Ω resistance in series with parallel combination of 2 Ω and 3 Ω resistance.

21. Three equal resistors connected in series across a source of emf together dissipate 10 watts of power. What would be the power dissipated in the same resistors when they are connected in parallel across the same source of emf?

(A) 10 watts

(B) 30 watts

(C) 90 watts

(D) 270 watts.

22. Current I in the figure is
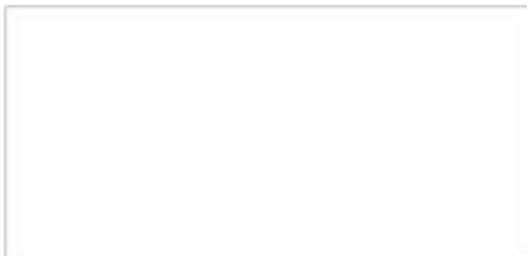
(A)1.5A

(B)0.5A

(C)3.5A

(D)2.5A

23.Four identical resistors are first connected in parallel and then in series. The resultant resistance of the first combination to the second will be

(A) 1 / 16 times

(B) 1 / 4 times

(C) 4 times

(D) 16 times.

24.Twelve wires of same length and same cross-section are connected in the form of a cube as shown in figure below. If the resistance of each wire is R, then the effective resistance between P and Q will be
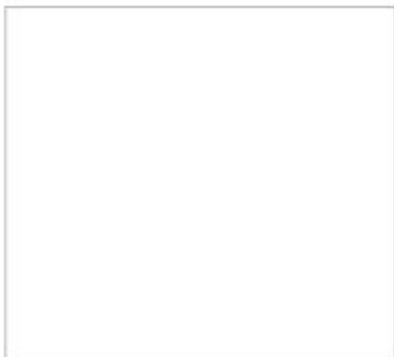
(A)R

(B) 5 / 6 R

(C) 3 / 4 R

(D) 4 / 3 R.

25. When P — Power, V — Voltage, I — Current, R — Resistance and G — Conductance, which of the following relation is incorrect?

(A) V — $\sqrt{(PR)}$

(B). P — $V^2 G$

(C) G — P / I^2

(D) I — $\sqrt{(P / R)}$

26. The unit of electrical conductivity is

(A) mho / metre

(B) mho / sq. m

(C) ohm / metre

(D) ohm / sq. m.

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

(A) 220 V, 60 W

(B) 220 V, 100 W

(C) 115 V, 60 W

(D) 115 V, 100 W.

28. The ratio of the resistance of a 100 W, 220 V lamp to that of a 100 W, 110 V lamp will be nearly

(A) 4

(B) 2

(C) 1 / 2

(D) 1 / 4

29. The resistance of a 100 W, 200 V lamp is

(A) 100 ohm

(B) 200 ohm

(C) 400 ohm

(D) 1600 ohm.

30. Two 1 kilo ohm, 1/2 W resistors are connected in series. Their combined resistance value and wattage will be

(A) 2 kΩ, 1/2 W

(B) 2 kΩ, 1 W

(C) 2 kΩ, 2 W

(D) 1 kΩ, 1/2 W.

answers

   16.D -17.B 18.D 19.C 20.B 21.C 22.A 23.A -24.B -25.C -26.A 27.D -28.A
     -29.C 30.B

31. Which method can be used for absolute measurement of resistances ?

(A) Ohm's law method

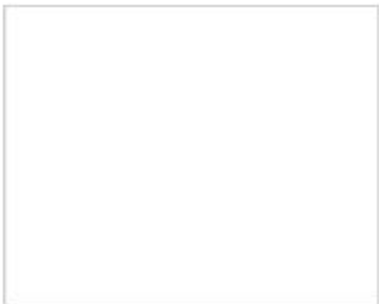(B) Wheatstone bridge method

(C) Releigh method

(D) Lortentz method.

32. Three 3 ohm resistors are connected to form a triangle. What is the resistance between any two of the corners?

(A) 3 / 4 ohms

(B) 3 ohms

(C) 2 ohms

(D) 4/3 ohm.

33.Five resistances are connected as shown in figure below. The equivalent resistance between the points A and B will be

(A) 35 ohms

(B) 25 ohms

(C) 15 ohms

(D) 5 ohms.

34.How many different combinations may be obtained with three resistors, each having the resistance R ?

(A) 3

(B) 4

(C) 5

(D) 6.

35.A wire of 0.14 mm diameter and specific resistance 9.6 micro ohm-cm is 440 cm long. The resistance of the wire will be
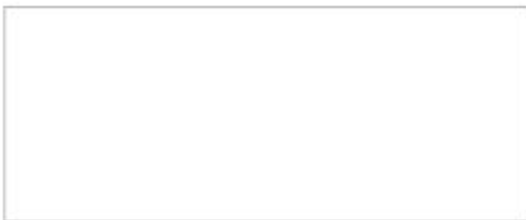
(A) 9.6 ohm

(B) 11.3 ohm

(C) 13.7 ohm

(D) 27.4 ohm.

36. Ohm's law is not applicable to

(A) DC circuits

(B) high currents

(C) small resistors

(D) semi-conductors.

37. A metal resistor has resistance of 10 ohm at 0°C and 11 ohms at 160°C, the temperature coefficient is

(A) 0.00625 / °C

(B) 0.0625 /°C

(C) 0.000625 /°C

(D) 0.625 /°C.

Questions 38 to 40 refer to Figure given below.

Five resistances are connected as shown and the combination is connected to a 40 V supply.

38. Voltage between point P and Q will be

(A) 40 V

(B) 22.5 V

(C) 20 V

(D) 17.5 V.

39. The current in 4 ohm resistor will be

(A) 2.1 A

(B) 2.7 A

(C) 3.0 A

(D) 3.5 A.

40. Least current will flow through

(A) 25 ohm resistor

(B) 18 ohm resistor

(C) 10 ohm resistor

(D) 5 ohm resistor.

41. Total power loss in the circuit is

(A)10W

(B) 50.2 W

(C) 205 W

(D) 410 W.

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. Specific resistance of a substance is measured in

(A) ohms

(B) mhos

(C) ohm-cm

(D) cm/ohm.

44. A wire of resistance R has it length and cross-section both doubled. Its resistance will become

(A) 4 R

(B) 2 R

(C) R

(D) R / 4.

45. Ohm's law is not applicable in all the following cases Except

(A) Electrolytes

(B) Arc lamps

(E) Insulators

(A) Vacuum ratio values.

Answers

31.B   32.C   33.D   34.B   35.D   36.D   37.C   38.B -39.D -40.A -41.C   42.D -43.C -44.C   45.C

46. The element of electric heater is made of
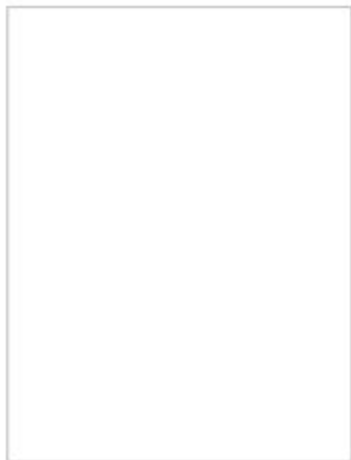
(A) copper

(B) steel

(C) carbon

(D) nichrome.

47. 5×10^{16} electrons pass across the section of a conductor in 1 minute 20 sec. The current flowing is

(A) 1mA

(B) 0.1 mA

(C) 0.01mA

(D) 10 mA.

48. Which of the following figures represents the effect of temperature on resistance for copper ?

(A) figure A

(B) figure B

(C) figure C

(D) figure D.

49. Three elements having conductance G_1, G_2 and G_3 are connected in parallel. Their combined conductance will be
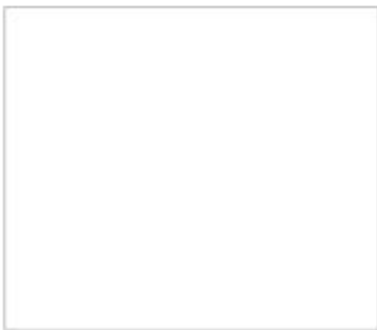
(A) $1/(1/G_1 + 1/G_2 + 1/G_3)$

(B) $(G_1G_2 + G_2G_3 + G_3G_1)/(G_1 + G_2 + G_3)$

(C) $1/(G_1 + G_2 + G_3)$

(D) $G_1 + G_2 + G_3$

Questions 50 to 53 refer to Figure given below:

50. The variation of resistance of iron and some alloys with temperature is shown in figure. The variation of carbon will be represented by

(A) curve A

(B) curve B

(C) curve C

(D) curve D.

51. Curves A and B represent the properties for materials which have

(A) low resistance

(B) low conductance

(C) negative resistance

(D) negative temperature coefficient.

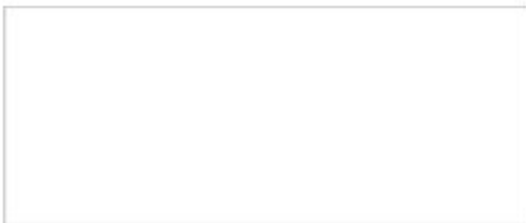**52.** Which of the following has negative temperature coefficient ?

(A) Brass

(B) Mercury

(C) Electrolytes

(D) Silver.

53. All of the following have negative temperature coefficient EXCEPT

(A) Paper

(B) Gold

(C) Rubber.

54. For the circuit shown below the current I flowing through the circuit will be

(A) 1 / 2 A

(B) 1 A

(C) 2 A

(D) 4 A.

55. A cube of material of side 1 cm has a resistance of 0.002 ohm between its opposite faces. If the same volume of the material has a length of 8 cm and a uniform cross-section, the resistance of this length will be

(A) 0.032 ohm

(B) 0.064 ohm

(C) 0.096 ohm

(D) 0.128 ohm.

56. A standard 60 W bulb is in series with a room heater and connected across the mains. If the 60 W bulb is replaced by 100 W bulb

(A) the heater output will increase

(B) the heater output will reduce

(C) the heater output will remains unaltered.

57. Two aluminium conductors have equal length. The cross-sectional area of one conductor is four times that of the other. If the conductor having smaller cross-sectional area has a resistance of 100 ohms the resistance of other conductor will be

(A) 400 ohms

(B) 100 ohms

(C) 50 ohms

(D) 25 ohms.

58. A nichrome wire used as heater coil has the resistance of 1 ohm/m. For a heater of 1000 W at 200 V, the length of wire required will be

(A) 10 m

(B) 20 m

(C) 40 m

(D) 80 m.

59. The hot resistance of a tungsten lamp is about 10 times the cold resistance. Accordingly, cold resistance of a 100 W, 200 V lamp will be (A) 4000 ohm

(B) 400 ohm

(C) 40 ohm

(D) 4 ohm.

60. Variable resistors are

(A) Wire wound resistors

(B) Thin film resistors

(C) Thick film resistors

(D) All of the above.

Answers

61. Low resistance can be accurately measured by

(A) Kelvin bridge

(B)Wheat stone bridge

(C) Wein's bridge

(D) None of the above.

62. A heating element of a hot plate on an electric cooking range draws 12 amperes from 240 V mains. How many kWh of energy will be consumed in one hour and 15 minutes

(A) 1.2

(B) 3.2

(C) 6.0

(D) 7.2.

63. Temperature coefficient of resistance is expressed in terms of

(A) ohms / ohms $^\circ$C

(B) mhos / ohm $^\circ$C

(C) mhos / $^\circ$C

(D) ohms / $^\circ$C.

64. If R_1 is the resistance of a coil of copper at t $^\circ$C and R_T is the resistance at T $^\circ$C and also the resistance temperature coefficient of copper per degree centrigrade at 0°C is 1/234.45, then R_1/R_T

(A) (1+t) / (1+T)

(B) (1+ 234.45t) / (1+234.45 T)

(C) (234.45 + t) / (234.45 + T)

(D) (234.45 + t^2) / (234.45 + T^2).

65. Resistivity is usually expressed in terms of

(A) mho

(B) ohm / °C

(C) ohms/cm-square

(D) ohms/cm-cube.

66. Which material is expected to have least resistivity?

(A) Copper

(B) Lead

(C) Mercury

(D) Zinc.

67. The shunt winding of a motor has a resistance of 85 ohm at 22°C. When the motor runs at full load, its resistance increases to 100 ohms. The resistance temperature coefficient of winding per 0°C is 0.004. The rise in temperature of the winding will be nearly

(A) 20°C

(B) 50°C

(C)70°C

(D) 100°C.

68. The resistance temperature coefficient is defined as

(A) increase in resistance per degree centigrade

(B) decrease in resistance per degree centigrade

(C) the ratio of increase in resistance per degree centigrade to the resistance at 0°C

(D) the ratio of increases in resistance per degree centigrade to the rate of rise of resistance at 0°C.

69. Two coils connected in series have resistance of 600 ohm and 300 ohm and temperature

coefficients of 0.1% and 0.4% respectively. The resistance of the combination at 50°C will be

(A) 1050 ohm

(B) 1001 ohm

(C) 1600 ohm

(D) 990 ohm.

70. A 100 W, 200 V filament lamp has operating temperature of 2000°C. The filament material has resistance temperature coefficient of 0.005 at 0°C per °C. The current taken by the lamp at the instant of switching with 200 V supply with filament temperature of 20°C will be

(A) 1 A

(B) 3 A

(C) 5 A

(D) 10A.

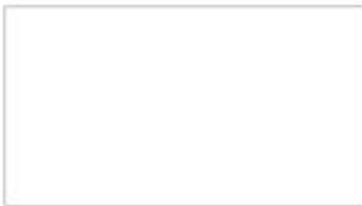**71.** A fuse is always installed in a circuit is

(A) Series

(B) Parallel.

72. The rating of fuse wire is expressed in terms of

(A) Ohms

(B) Mhos

(C) Amperes

(D) Watts.

73. Which of the following material is not used as fuse material?

(A) Silver

(B) Copper

(C) Aluminium

(D) Carbon.

Questions 74 to 78 refer to Figure below.

74. The voltage drop across the resistor 9 ohm will be
(A)18 V
(B) 12 V
(C) 9 V
(D) 6 V.

75. The voltage drop will be least in which resistor ?
(A) 2 ohm
(B) 3 ohm
(C) 6 ohm
(D) 3 ohm and 6 ohm.

76. The current through 6 ohm resistor will be
(A) 1 A
(B) 2 A
(C) 3 A
(D) 4 A.

77. The ratio of power dissipated in circuit ADB to that in circuit ABC will be

(A) 1

(B) 1.5

(C) 0.67

(D) 2.

78. Total power dissipated in the circuit is
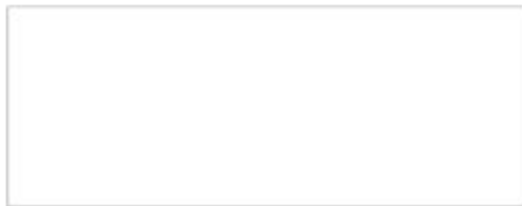
(A) 80 W

(B) 100 W

(C) 120 W

(D) 150 W.

79. The current carrying capacity of the fuse material depends on

(A) cross-sectional area

(B) length

(C) material

(D) all of the above.

80. According to the fuse law, the current carrying capacity varies as

(A) diameter

(B) $(\text{diameter})^{3/2}$

(C) $1 / \text{diameter}$

(D) $1 / (\text{diameter})^2$.

Questions 81 to 83 refer to Figure given below.

81. For the circuit shown in Figure above, the value of current I will be

(A) 10A

(B) 15A

(C) 20A

(D) 25A.

82. The combined resistance of the circuit is

(A) 10 ohms

(B) 5 ohms

(C) 4 ohms

(D) 2 ohms.

83. Total power dissipated in the circuit is

(A) 2.5 kW

(B) 5.0 kW

(C) 7.5 kW

(D)10 kW.

84. A 100 W bulb is connected in series with a room heater of 750 W. What will happen if the bulb is replaced by a 60W bulb?

(A) Heater output will increase

(B) Heater output will decrease

(C) Heater output will remain unchanged

(D) Bulb will not glow.

85. An immersion rod heats a bucket of water in 15 minutes. In order that the water should boil in 10 minutes

(A) length of heating element of the rod should be increased

(B) length of heating element of the rod should be reduced

(C) supply voltage should be reduced

(D) heating element of larger diameter should be used.

86. A lamp of 100 W at 200 V is supplied current at 100 volts. It will be equivalent to the lamp of

(A) 50 W

(B) 40 W

(C) 25 W

(D) 10 W.

87. Two electric bulbs of 100 W, 200 V are put in series and the combination is supplied 100 V. The power consumption of each bulb will be

(A) 100 / 2 W

(B) 100 / 4 W

(C) 100 / 8 W

(D) 100 / 16 W.

Questions 88 to 91 refer to Figure given below.
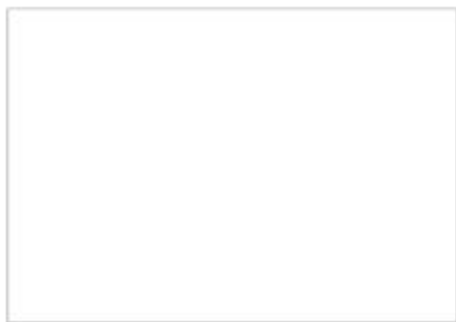
88. Three lamps are in circuit as shown in Figure given above. The lamp of 100 W will have maximum brightness when

(A) key k_1 is closed, k_2 is open and k_3 is closed

(B) k_1 is open, k_2 is closed and k_3 is open

(C) k_1 is open, k_2 is closed and k_3 is also closed

(D) k_1 is closed, k_2 is open and k_3 is also open.

89. When switches k_1 and k_2 are open and k_3 is closed

(A) 100 W lamp will glow brighter than 40 W lamp

(B) 40 W lamp will glow brighter than 100 W lamp

(C) Both will glow at their full brightness

(D) Both will glow at less than their full brightness.

90. Which of the following statements is necessarily correct ?

(A) 40 W bulbs will always glow at full brightness

(B) 100 W bulb will always glows at full brightness

(C) Whatever be the position of keys, at least one 40 W bulb will always glow

(D) Whenever current flows through the circuit, 100 W bulb will always glow.

Answers

76.C 77.B 78.C 79.D 80.B 81.D 82.C 83. A -84.B 85.B 86.C 87.D 88.B 89.B 90.D

Electric Circuits Theory

Electric Current and Ohm's Law

Multiple Choice Questions of Electric Current and Ohm's Law (91-105):
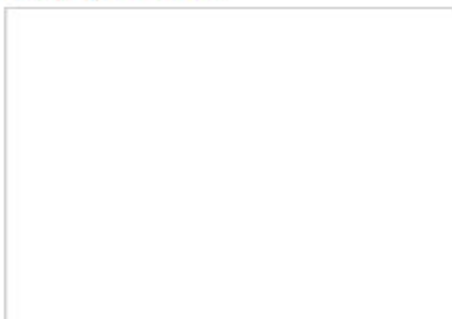
91. 40 W bulb A will be least bright when

(A) only keys k_1 and k_2 are open

(B) only keys k_2 is open

(C) only keys k_3 is open

(D) all keys are closed.

92. The power consumption of the circuit will be maximum when

(A) key k_1 and k_3 are closed and k_2 is open

(B) key k_1 is closed, k_2 and k_3 are open

(C) key k_1 and k_2 are closed and k_3 is open

(D) all the keys are closed.

93. Which of the following lamps will have least resistance at room temperature ?

(A) 200 W, 220 V

(B) 100 W, 220 V

(C) 60 W, 220 V

(D) 25 W, 220 V.

94. Filaments of electric bulbs are usually made of

(A) Nichrome

(B) Tungsten

(C) Copper

(D) Carbon.

95. The value of supply voltage for 500 W ,5 ohm load is

(A) 500 V

(B) 100V

(C) 50 V

(D) 10V.

96. Which resistor will be physically larger in size ?

(A)10 ohm, 50 W

(B) 100 ohm, 10 W

(C) 1 kohm, 1 W

(D) 10 Mohm, 1/2 W.

97. Four resistances R_1, R_2, R_3 and R_4 are connected in series against 220 V supply. The resistances are such that $R_1 > R_2 > R_3 > R_4$. The least power consumption will be in

(A) resistor R_1

(B) resistor R_2

(C) resistor R_3

(D) resistor R_4.

98. 100 resistors of 100 ohms each arc connected in parallel. Their equivalent resistances will be

(A) 10,000 ohms

(B) 100 ohms

(C) 1 ohm

(D) 1/ 10000 ohm.

99. For a fixed supply voltage the current flowing through a conductor will decrease when

(A) cross-sectional area of the conductor is increased

(B) length of the conductor is increased

(C) length of the conductor is reduced

(D) cross-sectional area is increased and length is decreased.

**100.** When current flows through heater coil it glows but supply wiring does not glow because

(A) supply wiring is covered with insulation layer

(B) current through supply line flows at slower speed.

(C) supply wires are made of superior material

(D) resistance of heater coil is more than that supply wires.

101. The resistance of 1 meter length of 18 gauge copper wire is k ohm. The resistance of one metre length of 24 gauge copper wire will be

(A) k / 2 ohm

(B) 18 / 24 kohm

(C) k ohm

(D) more than k ohm.

102. In the circuit shown below, the resistance R has a value that depends on the current Specially, R is 20 ohms when the current I is zero, and the amount of increase in resistance is numerically equal to one-half the current. What is the value of the current in the circuit?
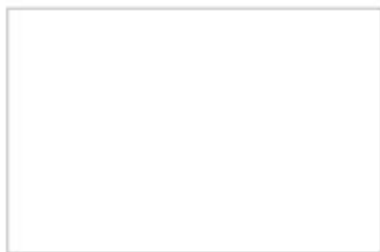
(A) 8.33 A

(B) 10.0 A

(C) 12.5 A

(D) 50 A.

103. If the length and diameter of a conductor is tripped, the resistance will increase approximately by

(A) 66 $^2/_3$ %

(B) 33 $^1/_3$ %

(C)-66 $^2/_3$ %

(D) -33 $^1/_3$ %.

104. If the resistance of an incandescent light bulb changes as the voltage across the bulb is changed, which of the following is true ?

(A) The internal inductance of the bulb causes this change

(B) The bulb is said to have a low ionization potential

(C) The bulb has constant resistance of the current through the bulb is changed

(D) The bulb is a type of non-linear resistance.

105. Which method can be used for absolute measurement of resistance ?

(A) Ohm's law method

(B) Wheatstone bridge method

(C) Raleigh method

(D) Lortentz method.

Answers
91.A 92.A 93.A 94.B 95.C 96.A -97.D 98.C -99.B 100.D 101.D 102.B 103.C 104.D -105.B