Ravi Maths Tuition

Electricity

10th Standard

Science

Multiple Choice Question 64 x 1 = 64

1) A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R' then the ratio R/R' is

(a) 1/25 (b) 1/5 (c) 5 (d) 25

2) Which of the following terms does not represent electrical power in a circuit?

(a) I^2R (b) IR^2 (c) VI (d) V^2/R

3) An electric bulb is rated 220 V and 100 W. When it is operated on 110 V, the power consumed will be

(a) 100 W (b) 75 W (c) 50 W (d) 25 W

4) Two conducting wires of the same material and of equal lengths and equal diameters are first connected in series and then parallel in a circuit across the same potential difference. The ratio of heat produced in series and parallel combination would be

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

5) Materials which allow larger current to flow through them are called

(a) Alloy (b) Semiconductors (c) Insulators (d) Conductors

6) The unit of specific resistance is

(a) Ohm per meter (b) Ohm (c) Ohm per second (d) Ohm meter

7) 1 kilowatt hour (kWh) is equal to

(a) 3.6×10^6J (b) $3.6 \times 10_8$J (c) 3.6×10^2J (d) $3.6 \times 10_5$J

8) The commonly used safety fuse wire is made of

(a) Lead (b) Copper (c) Nickel (d) An alloy of tin and lead

9) Electric potential is

(a) Neither scalar nor vector (b) Scalar quantity (c) Vector quantity (d) Sometimes scalar sometimes vector

10) Ohm's law is valid only when

(a) Graph between V and I is a straight line (b) Temperature increases (c) Temperature decreases (d) Temperature remains constant.

11) If I is the current through a wire and 1 is the charge of electron, then no. of electrons in t seconds will be

(a) 1/It (b) It/1 (c) $\frac{11}{t}$ (d) It1

12) Electrical resistivity of a given metallic wire depends upon

(a) its length (b) its thickness (c) its shape (d) nature of the material

13) A current of 1 A is drawn by a filament of an electric bulb. Number of electrons passing through a cross section of the filament in 16 seconds would be roughly

(a) 10^{20} (b) 10^{16} (c) 10^{18} (d) 10^{23}

14) What is the maximum resistance while can be made using five resistors each of $1/5\Omega$.

(a) $1/5\Omega$ (b) 10Ω (c) $1/10\Omega$ (d) 25Ω

15) Which of the following represents voltage?

(a) $\frac{Work\ done}{current \times time}$ (b) Work done $\times$ charge (c) $\frac{Work\ done \times time}{current}$ (d) Work done $\times$ charge $\times$ time

16) A cylindrical conductor of length l and uniform area of cross section A has resistance R, another conductor of length 2l and resistance R of the same material has area of cross section?

(a) A/2 (b) 3A/2 (c) 2A (d) 3A

17) If the current through a resistor is increased by 100% (assume that temperature remains unchanged), the increase in power dissipated will be

(a) 100% (b) 200% (c) 300% (d) 400%

18) The resistivity does not charge if

(a) the material is charged (b) the temperature is charged (c) the shape of the resistor is charge

(d) both material and temperature are changed

19) In an electrical circuit three incandescent bulbs A, B and C of rating 40 W, 60 W and 100 W respectively are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness?

(a) Brightness of all the bulbs will be the same (b) Brightness of bulb A will be the maximum

(c) Brightness of bulb B will be more than that of A

(d) Brightness of bulb B will be less than that of B

20) In an electrical circuit two resistors of 2Ω and 4Ω respectively are connected in series to a 6 V battery. The heat dissipated by the 4Ω resistor in 5s will be

(a) 5 J (b) 10 J (c) 20 J (d) 30 J

21) An electric kettle consumes 1 Kw of electric power when operated at 220 V. A fuse wire of what rating must be used for it?

(a) 1A (b) 2A (c) 4A (d) 5A

22) Two resistors of resistance 2Ω and 4Ω when connected to a battery will have

(a) same current flowing through them when connected in parallel

(b) same current flowing through them when connected in series

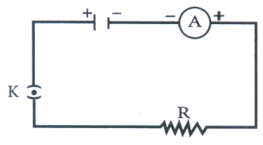
(c) same potential difference across them when connected in series

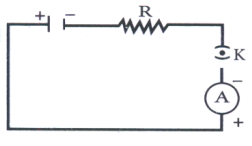
(d) different potential difference across them when connected in parallel

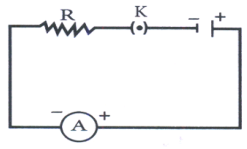
23) Unit of electric power may also be expressed as

(a) volt ampere (b) kilowatt hour (c) watt second (d) joule second

24) A cell, a resistor, a key and ammeter are arranged as shown in the circuit diagrams. The current recorded in the ammeter will be

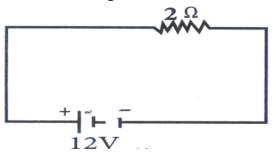
(a) maximum in 

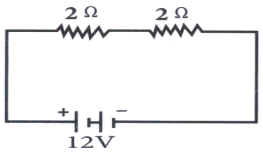
(b) maximum in 

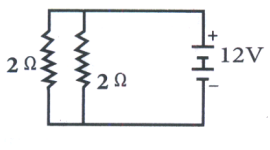
(c) maximum in 

(d) the same in all the cases

25) In the following circuits, heat produced in the resistor or combination of resistors connected to a 12 V battery will be

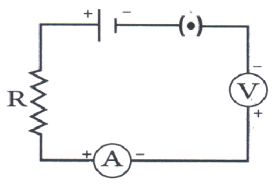


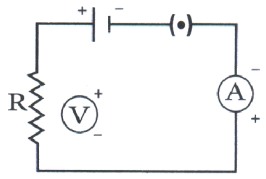


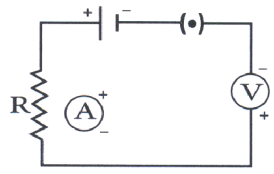


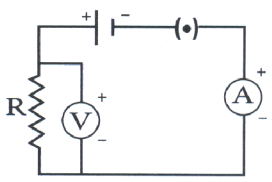
(a) same in all the cases (b) maximum in case (c) maximum in case (d) minimum in case

26) Identify the circuit in which the electrical components have been properly connected.

(a) 

(b) 

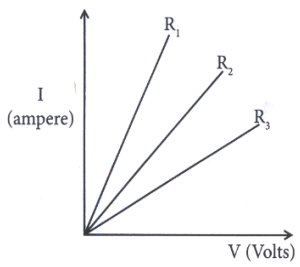
(c) 

(d) 

27) The proper representation of series combination of cells obtaining maximum potential is

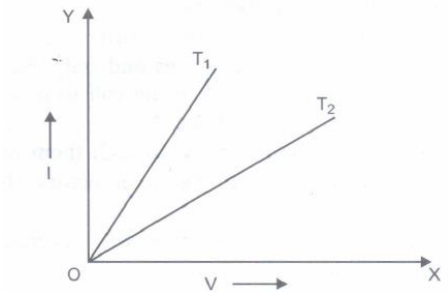
(a)  (b)  (c)  (d) 

28) A student carries out an experiment and plots the V-I graph of three samples of nichrome wire with resistances R_1, R_2 and R_3 respectively. Which of the following is true?



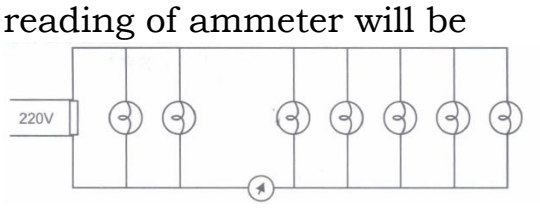
(a) $R_1 = R_2 = R_3$ (b) $R_1 > R_2 > R_3$ (c) $R_3 > R_2 > R_1$ (d) $R_2 > R_3 > R_1$

29) For metallic conductor voltage uses current graph is shown at two different temperatures T_1 and T_2From the graph it follows:



(a) $T_1 = T_2$ (b) $T_1 > T_2$ (c) $T_1 < T_2$ (d) None of above

30) Seven identical lamps of resistance 220 Ω each are connected to a 220 V line as shown in figure. Then reading of ammeter will be



(a) $\frac{1}{10}A$ (b) $\frac{2}{5}A$ (c) $\frac{3}{10}A$ (d) None of these

31) Number of kilowatt hours $= \frac{volt \times ampere \times .....}{1000}$

(a) Time in seconds (b) Time in minutes (c) Time in hours (d) Time in days

32) A man has five resistors each of $1/5\Omega$ What is the maximum resistance he can obtain by connecting them?

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

33) Kilowatt hour is unit of

(a) Energy (b) Power (c) Impulse (d) Force

34) Conventionally the direction of the current is taken as

(a) Direction of flow of -ve charge (b) The direction of flow of atomic

(c) The direction of flow of molecules (d) The direction of flow of +ve charge

35) The resistance of a conductor is reduced to half its initial value. In doing so the heating effects in the conductor will become

(a) half (b) double (c) one fourth (d) four times

36) The coil of heater is cut into two equal halves and only one of them is used in the heater. The ratio of heat produced by half of the coil to produced in original coil is

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

37) The resistivity of a wire

(a) varies with its length (b) varies with its mass (c) varies with its cross section

(d) is independent of length, cross section and mass of wire

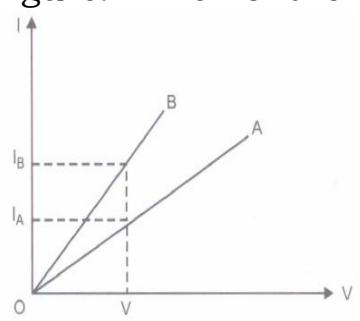
38) What sets electron into motion in an electric circuit

(a) Battery/cell (b) Resistor (c) Rheostat (d) Ammeter

39) An electric geyser has rating 2000 W, 220 Y on it. What is the minimum setting of fuse wire that may be required for use with this geyser?

(a) 5 A (b) 10 A (c) 15 A (d) 20 A

40) Graphs between electric current and potential difference across two conductors A and B are shown in the figure. Which of the following conductor has more resistance?



(a) B (b) A (c) Both have equal resistance (d) None of these

41) If the resistance of wire A is four times resistance of wire B then the ratio of cross sectional areas of wires is

(a) 1:2 (b) 1:4 (c) 1:8 (d) 1:6

42) It the resistance of wire A is four times resistance of wire B then ratio of radii of two wires is

(a) 1: 2 (b) 1:4 (c) 1:6 (d) 1:8

43) Two metallic wires A and B are connected in parallel. Wire A has length 'l' and radius 'r' and wire B has a length '2l' and radius '2r'. Then the ratio of total resistance of parallel combination and the resistance of wire A is

(a) 1:2 (b) 1:3 (c) 1:4 (d) 1:5

44) Correct formula for Joules law of heating is

(a) $H = I^2RT$ (b) $H = IVT$ (c) $H = \frac{V^2T}{R}$ (d) All of the above

45) In household electric circuit different appliances are connected in parallel to each other because

(a) The appliances work at same voltage

(b) The appliances can be operated independent of each other

(c) Even if a component of a electric circuit fails other can work efficiently (d) All of the above

46) The resistance of germanium _____ with rise in temperature

(a) increase (b) decreases (c) remains same (d) first increases then decreases

47) If a wire of resistance R is melted and recast into half of its length, the new resistance of wire will be

(a) R/4 (b) R/2 (c) R (d) 2R

48) If R_1 and R_2 are the resistance of statements of a 400 Wand 200 W lamp designed to operate at same voltage then

(a) $R_1 = 2R_2$ (b) $R_2 = 2R_1$ (c) $R_2 = 4R_1$ (d) $R_1 = R_2$

49) An electric bulb is rated 220 V -100 W If it is operated at 110 V then power consumed by it will be

(a) 100 W (b) 50 W (c) 25 W (d) 400 W

50) A current of 2 A passes through a conductor and produces 80 joules of heat in 10 seconds. The resistance of the conductor is

(a) 0.5 Ω (b) 2Ω (c) 4Ω (d) 20Ω

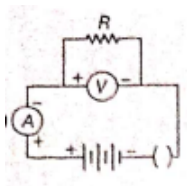
51) A house is fitted with 10 tubes each of 40 W If all tubes are lighted for 10 hours and if the cost of one unit of electricity energy is Rs 2.50 the total cost of electricity consumption is

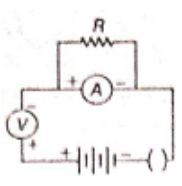
(a) Rs 100 (b) Rs 20 (c) Rs 25 (d) Rs 10

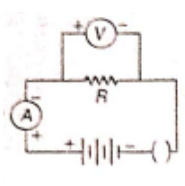
52) The expressions that relate (i) Q, l and t and (ii) Q,V and W respectively are (Here, the symbols have their usual meanings)

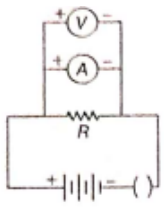
(a)		(b)		(c)		(d)	
(i) I = Q/t	(ii) W = V/Q	(i) Q = I x t	(ii) W = V x Q	(i) Q = I/t	(ii) V = W/Q	(i) I = Q/t	(ii) Q = V/W

53) Which one of the following Is the correct set-up for studying the dependence of the current on the potential difference across a resistor and why?

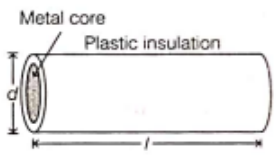
(a) 

(b) 

(c) 

(d) 

54) Plastic insulation surrounds a wire having diameter d and length l as shown above. A decrease in the resistance of the wire would be produced by an increase in the



(a) length l of the wire (b) diameter d of the wire (c) temperature of the wire

(d) thickness of the plastic insulation

55) A cylindrical conductor of length l and uniform area of cross section A has resistance R, another conductor of length 2.5l and resistance 0.5 R of the same material has area of cross section

(a) 5 A (b) 2.5 A (c) 0.5 A (d) 1/5 A

56) In case of four wires of same material, the resistance will be minimum, if the diameter and length of the wire respectively are

(a) D/2 and L/4 (b) D/4 and 4L (c) 2D and L (d) 4D and 2L

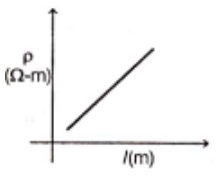
57) A cylindrical conductor of length l and uniform area of cross section A has resistance R. The area of cross-section of another conductor of same material and same resistance but of length 2l is

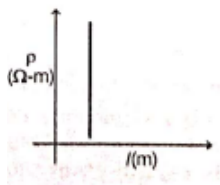
(a) A/2 (b) 3A/2 (c) 2A (d) 3A

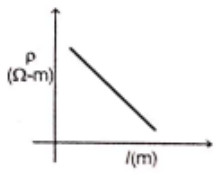
58) A complete circuit is left on for several minutes, causing the connecting copper wire to become hot. As the temperature of the wire increases, the electrical resistance of the wire

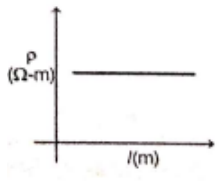
(a) decreases (b) remains the same (c) increases (d) increases for sometime and then decreases

59) Raman wants to draw a graph to show how the resistivity (ρ) of a wire changes with the length (l) of the wire. What should his graph look like?

(a) 

(b) 

(c) 

(d) 

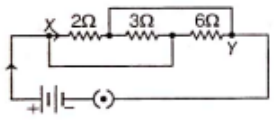
60) Two LED bulbs of 10 W and 5 W are connected in series. If the current flowing through 5 W bulb is 0.005 A, the current flowing through 10 W bulb is

(a) 0.02 A (b) 0.01 A (c) 0.005 A (d) 0.0025 A

61) The maximum resistance which can be made using four resistors, each of resistance 1/2 Ω is

(a) 2Ω (b) 1Ω (c) 2.5Ω (d) 8Ω

62) In the given circuit the total resistance between X and Y is



(a) 12Ω (b) 4Ω (c) 6Ω (d) 1Ω

63) If four identical resistors, of resistance 8Ω, are first connected in series so as to give an effective resistance Rs, and then connected in parallel so as to give an effective resistance Rp, then the ratio of Rs/Rp is

(a) 32 (b) 2 (c) 0.5 (d) 16

64) In domestic electric circuits, the wiring with 15 A current rating is for the electric devices which have

(a) higher power ratings such as geyser (b) lower power ratings such as fan

(c) metallic bodies and low power ratings (d) non-metallic bodies and low power ratings

Assertion and reason 33 x 1 = 33

65) **Assertion**: The V-I graph is a straight line.

Reason: V / I is a constant ratio.

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

66) **Assertion:** In an electric circuit, a device called rheostat is often used to change the resistance in the circuit

Reason: A component used to regulate current without changing the voltage source is called variable resistance.

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

67) **Assertion** : An insulator always offers higher resistance.

Reason: The insulator allows the smooth flow of electric current.

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

68) **Assertion:** The ammeter reading is decreased when a thicker wire of the same material and of the same length is used in the circuit.

Reason: The thick wire does not allow the current to flow through it.

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

69) **Assertion:** The resistivity of an alloy is generally higher than that of its constituent metals
Reason: The alloys are used in heating devices.
Codes
(a) If both assertion and reason are true and the reason is correct explanation of assertion.
(b) If both assertion and reason are true but reason is not a correct explanation of assertion.
(c) If assertion is true and reason is false.
(d) If both assertion and reason are false.

70) **Assertion:** In a series combination of resistors the current is the same in every part of the circuit.
Reason: The path of flow of electrons is the same.
Codes
(a) If both assertion and reason are true and the reason is correct explanation of assertion.
(b) If both assertion and reason are true but reason is not a correct explanation of assertion.
(c) If assertion is true and reason is false.
(d) If both assertion and reason are false.

71) **Assertion:** The bulbs are usually filled with chemically inactive gases like nitrogen and ozone.
Reason: The heat emitted by bulb helps in glowing of these gases.
Codes
(a) If both assertion and reason are true and the reason is correct explanation of assertion.
(b) If both assertion and reason are true but reason is not a correct explanation of assertion.
(c) If assertion is true and reason is false.
(d) If both assertion and reason are false.

72) **Assertion:** Electrons are consumed in an electric circuit
Reason: The electric bill is paid for the loss of electrons.
Codes
(a) If both assertion and reason are true and the reason is correct explanation of assertion.
(b) If both assertion and reason are true but reason is not a correct explanation of assertion.
(c) If assertion is true and reason is false.
(d) If both assertion and reason are false.

73) **Assertion:** The number of electrons in 1C of charge are 6.25×10^{18} electrons.
Reason: 1C = n x charge on electron $\Rightarrow$ 1C = 1.602×10^{-19} x n.
Codes
(a) If both assertion and reason are true and the reason is correct explanation of assertion.
(b) If both assertion and reason are true but reason is not a correct explanation of assertion.
(c) If assertion is true and reason is false.
(d) If both assertion and reason are false.

74) **Assertion:** Electric fan works on principle of magnetic effect of current.
Reason: Electric generator works on principle of electromagnetic induction.
Codes
(a) If both assertion and reason are true and the reason is correct explanation of assertion.
(b) If both assertion and reason are true but reason is not a correct explanation of assertion.
(c) If assertion is true and reason is false.
(d) If both assertion and reason are false.

75) **Assertion:** 100 J of work is required to transfer 20 C of charge, potential difference is 5 volt
Reason: $\mathrm{V} = \frac{\mathrm{W}}{\mathrm{Q}} = \frac{100\ \mathrm{J}}{5\ \mathrm{V}} = 20\mathrm{C}$
Codes
(a) If both assertion and reason are true and the reason is correct explanation of assertion.
(b) If both assertion and reason are true but reason is not a correct explanation of assertion.
(c) If assertion is true and reason is false.
(d) If both assertion and reason are false.

76) **Assertion:** When two resistance of 4Ω are connected in series, total resistant is 8 ohms.

Reason: When two resistances of 4Ω are connected in parallel total resistance is 20Ω

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

77) **Assertion:** The graph between V and I are straight line.

Reason: V is directly proportional to 'I' and the slope gives value of 'R'.

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

78) **Assertion:** Ampere is flow of electric charge at the rate of 1coulomb per second.

Reason: S.I unit of charge is coulomb

Codes

(a) If both assertion and reason are true and the reason is correct explanation of assertion.

(b) If both assertion and reason are true but reason is not a correct explanation of assertion.

(c) If assertion is true and reason is false.

(d) If both assertion and reason are false.

79) **Assertion:** Fuse wire must have high resistance and low melting point.

Reason: Fuse is used for small current flow only.

Codes

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

(b) Both A and R are true, but R is not the correct explanation of the assertion.

(c) A is true, but R is false.

(d) A is false, but R is true.

80) **Assertion:** The connecting wires are made of copper.

Reason: The electrical conductivity of copper is high.

Codes

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

(b) Both A and R are true, but R is not the correct explanation of the assertion.

(c) A is true, but R is false.

(d) A is false, but R is true.

81) **Assertion:** Electron has a negative charge.

Reason: Electrons move always from a region of higher potential to a region of lower potential.

Codes

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

(b) Both A and R are true, but R is not the correct explanation of the assertion.

(c) A is true, but R is false.

(d) A is false, but R is true.

82) **Assertion :** Heater wire must have high resistance and high melting point.

Reason: If resistance is high, the electric conductivity will be less.

Codes

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

(b) Both A and R are true, but R is not the correct explanation of the assertion.

(c) A is true, but R is false.

(d) A is false, but R is true.

83) **Assertion:** In a chain of bulbs, 50 bulbs are joined in series. One bulb is removed now and circuit is completed again. If the remaining 49 bulbs are again connected in series across the same supply, then light gets decreased in the room.
Reason: Net resistance of 49 bulbs will be less than 50 bulbs.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

84) **Assertion:** Current is the rate of flow of charge.
Reason : Electric current will not flow between two charged bodies when connected, if they are at same potential.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

85) **Assertion:** A bird perches on a high power line and nothing happens to the bird.
Reason: The circuit is incomplete for the bird sitting on high power line.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

86) **Assertion:** When a wire is stretched to three times of its length, its resistance becomes 9 times.
Reason: Resistance is directly proportional to length of wire.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

87) **Assertion:** It is advantageous to transmit electric power at high voltage.
Reason: High voltage implies high current.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

88) **Assertion:** Bending a wire does not affect electrical resistance.
Reason: Resistance of a wire is proportional to resistivity of material.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

89) **Assertion:** The coil of a heater is cut into two equal halves and only one of them is used into heater, The heater will now require half the time to produce the same amount of heat.
Reason: The heat produced is directly proportional to square of current.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

90) **Assertion:** A voltmeter and ammeter can be used together to measure resistance but not power.
Reason: Power is proportional to voltage and current.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

91) **Assertion:** The 200 W bulbs glows with more brightness than 100W bulbs.
Reason: A 100 watt bulb has more resistance than a 200W bulb.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

92) **Assertion:** If 10 bulbs are connected in series and one bulb fused, then the remaining 9 bulbs will not work.
Reason: Bulb of higher wattage will give less bright light.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

93) **Assertion:** Good conductors of heat are also good conductors of electricity and vice versa.
Reason: Mainly electrons are responsible for conduction.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

94) **Assertion:** The wires supplying current to an electric heater are not heated appreciably.
Reason: Resistance of connecting wires is very small and H ∞ R.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

95) **Assertion:** A current carrying wire should be charged.
Reason: The current in a wire is due to flow of free electrons in a definite direction.
Codes
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

96) Assertion (A) : At high temperatures, metal wires have a greater chance of short circuiting.
Reason (R) : Both resistance and resistivity of a material vary with temperature.
(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If Assertion is false but Reason is true.

97) Assertion (A) : Alloys are commonly used in electrical heating devices like electric iron and heater.
Reason (R) : Resistivity of an alloy is generally higher than that of its constituent metals but the alloys have lower melting points than their constituent metals.
(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If Assertion is false but Reason is true.

Passage Based Questions 3 x 1 = 3

98) Europe and most other countries in the world use a voltage which is twice that of the US. It is between 220 and 240 volts, whereas in Japan and in most of the Americas the voltage is between 100 and 127 volts. The system of three-phase alternating current electrical generation and distribution was invented by a nineteenth century creative genius named Nikola Tesla. He made many careful calculations and measurements and found out that 60 Hz (Hertz, cycles per second) was the best frequency for alternating current (AC) power generating. He preferred 240 volts, which put him at odds with Thomas Edison, whose direct current (DC) systems were 110 volts. Perhaps Edison had a useful point in the safety factor of the lower voltage, but DC couldn't provide the power to a distance that AC could.
Answer the following questions based on the above information
(a) How is the electricity distributed across the globe?
(b) The major part of the world uses the same voltage as in India, what is the frequency of this voltage distribution?
(c) How is DC useful over AC?
(d) The laptop purchased from US when tries to charge in Asia, what could be the problem?

99) Sometimes you get shock when you get out of your car. While sitting in the car, electrostatic charges are generated on the car seat and the person's body, due to contact and movement between the clothes and the seat. When the person leaves the seat, they take half of this charge with them. As they get out of the vehicle, their body voltages rises due to this charge. A voltage of 10,000 Volts is not unusual. When they reach to touch the vehicle door, the electrostatic discharge and shock occurs as their hand approaches the metal door. The voltage build-up can often be avoided by holding onto a metal part of the door frame as you leave the seat and before you make contact with the ground. This provides a return dissipation path for the charge on your body.
Answer the following questions based on the above information
(a) Why does our body get static charge?
(b) It is common to get shock when you touch the metal knob, how can you avoid it?
(c) In winters one gets more static shocks. Explain
(d) How can you avoid static shock?

100) In 1827, a German physicist George Simon Ohm (1787-1854) found the relationship between the current I flowing in a metallic wire and the potential difference across its terminal. The potential difference, V across the ends of a given metallic wire in electric circuit is directly proportional to the current flowing through it, provided temperature remains the same. This is called Ohm's law.
$\boxed{V \propto I}$ $\boxed{V = IR}$
(a) What is resistance?
(b) Show graph between V vs I
(c) Calculate voltage when current is 0.6A, and resistance is 10Ω
(d) How does resistance depend on temperature?

2 Marks 129 x 2 = 258

101) Define the unit of current.

102) Calculate the number of electrons constituting one coulomb of charge.

103) Name a device that helps to maintain a potential difference across a conductor.

104) What is meant by saying that the potential difference between two points is 1 V?

105) How much energy is given to each coulomb of charge passing through a 6 V battery?

106) On what factors do the resistance of a conductor depend?

107) Will current flow more easily through a thick wire or a thin wire of the same material, when connected to the same source? Why?

108) Let the resistance of an electrical component remains constant while the potential difference across the two ends of the component decreases to half of its former value. What change will occur in the current through it?

109) Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?

110) Use the data in Table and Answer the following -

	Material	**Resistivity (Ω m)**
Conductors	Silver	1.60×10^{-8}
	Copper	1.62×10^{-8}
	Aluminium	2.63×10^{-8}
	Tungsten	5.20×10^{-8}
	Nickel	6.84×10^{-8}
	Iron	10.0×10^{-8}
	Chromium	12.9×10^{-8}
	Mercury	94.0×10^{-8}
	Manganese	1.84×10^{-6}
Alloys	Constantan (alloy of Cu and Ni)	49×10^{-6}
	Manganin (alloy of Cu, Mn and Ni)	44×10^{-6}
	Nichrome (alloy of Ni, Cr, Mn and Fe)	100×10^{-6}
Insulators	Glass	$10^{10} - 10^{14}$
	Hard rubber	$10^{13} - 10^{16}$
	Ebonite	$10^{15} - 10^{17}$
	Diamond	10^{12} - 10^{13}
	Paper (dry)	10^{12}

a) Which among iron and mercury is a better conductor?
b) Which material is the best conductor?

111) Draw a schematic diagram of a circuit consisting of a battery of three cells of 2 V each, a 5Ω resistor, a 8Ω resistor, and a 12Ω resistor, and a plug key, all connected in series.

112) Draw a schematic diagram of a circuit consisting of a battery of three cells of 2V each, a 5Ω resistor, an 8Ω resistor, and a 12Ω resistor and a plug key, all connected in series. Now, connect the ammeter to measure the current through the resistors and a voltmeter to measure the potential difference to measure the potential difference across the 12Ω resistors. What would be the readings in the ammeter and the voltmeter?

113) Judge the equivalent resistance when the following are connected in parallel
(a) 1Ω and $10^6\Omega$
(b) 1Ω , $10^3\Omega$, and $10^6\Omega$.

114) An electric lamp of 100 Ω , a toaster of 50 Ω , and a water filter of resistance 500 Ω are connected in parallel to a 220 V source. What is the resistance of an electric iron connected to the same source that takes as much current as all the three appliances, and what is the current through it?

115) What are the advantages of connecting electrical devices in parallel with the battery instead of connecting them in series?

116) How can three resistors of resistances 2Ω , 3Ω , and 6Ω be connected to give a total resistance of (a) 4 Ω (b) 1Ω ?

117) What is (a) the highest, (b) the lowest total resistence. Which can be secured by combinations of four coils of resistance 4Ω , 8Ω , 12Ω , 24Ω ?

118) Why does the cord of an electric heater not glow while the heating element does?

119) Compute the heat generated while transferring 96000 coulomb of charge in one hour through a potential difference of 50 V.

120) An electric iron of resistance 20 Ω takes a current of 5A. Calculate the heat developed in the 30 s.

121) What determines the rate at which energy is delivered by a current?

122) An electric motor takes 5 A from a 220 V line. Determine the power of the motor and energy consumed in 2 h.

123) A battery of 9 V is connected in series with resistors of 0.2 Ω , 0.3 Ω , 0.4 Ω , 0.5Ω and 12 Ω , respectively. How much current would flow through the 12Ω resistors?

124) How many 176Ω resistors (in parallel) are required to carry 5 A on a 220 V line?

125) How is a voltmeter connected in the circuit to measure the potential difference between two points?

126) A copper wire has diameter 0.5 mm and resistivity of p = 1.6 x 10^{-8} Ωm . What will be the length of this wire to make its resistance 10 Ω ? How much does the resistance change if diameter is doubled?

127) The values of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are as given below:

I(amperes)	0.5	1.0	2.0	3.0	4.0
V(volts)	1.6	3.4	6.7	10.2	13.2

Plot a graph between V and I and also calculate the resistance of that resistor.

128) When a 12 V battery is connected across an unknown resistor, there is a current of 2.5 mA in the circuit. Find the value of the resistance of the resistor.

129) Show how you would connect three resistors, each of resistance 6 Ω, so that the combination has a resistance of (i) 9 Ω, (ii) 4 Ω.

130) Several electric bulbs designed to be used on a 220 V electric supply line are rated at 10 W. How many lamps can be connected in parallel with each other across the two wires of 220 V line, if the maximum allowable current is 5 A?

131) A hot plate of an electric oven connected to a 220 V line has two resistance coils A and B, each of 24 Ω resistance, which may be used separately, in series, or in parallel. What are the currents in the three cases?

132) Compare the power used in the 2 Ω resistors in each of the followings circuits:
(i) a 6 V battery in series with 1 Ω and 2 Ω resistors, and
(ii) a 4 V battery in parallel with 12 Ω and 2 Ω resistors.

133) Two lamps, one rated at 100 W at 220 V, and the other 60 W at 220 V, are connected in parallel to electric mains supply. What current is drawn from the line if the supply voltage is 220 V?

134) Which uses more energy, a 250 W TV set in 1 h or a 1200 W toaster in 10 min?

135) An electric heater of resistance 8 Ω draws 15 A from the service mains 2 hours. Calculate the rate at which heat is developed in the heater.

136) Explain the following.
(a) Why is the tungsten used almost exclusively for filament of electric lamps?
(b) Why are the conductors of electric heating devices, such as bread-toasters and electric irons, made of an alloy rather than a pure metal?
(c) Why is the series arrangement not used for domestic circuits?
(d) How does the resistance of a wire vary with its area of cross-section?
(e) Why are copper and aluminium wires usually employed for electricity transmission?

137) What does an electric circuit mean?

138) A current of 0.5 A is drawn by a filament of an electric bulb for 10 minutes. Find the amount of electric charge that flows through the circuit.

139) How much work is done in moving a charge of 2 C across two points having a potential difference 12 V?

140) (a) How much current will an electric bulb draw from a 220 V source, if the resistance of the bulb filament is 1200 Ω?
(b) How much current will an electric heater coil draw from a 220 V source, if the resistance of the heater coil is 100 Ω?

141) An electric bulb is connected to a 220 V generator. The current is 0.50 A. What is the power of the bulb?

142) An electric refrigerator rated 400 W operates 8 hour/day. What is the cost of the energy to operate it for 30 days at Rs 3.00 per kW h?

143) What does an electric current mean?

144) What is meant by the statement, "Potential difference between points A and B in an electric field is 1 volt"?

145) Why is the series arrangement not used for connecting domestic electric appliances in a circuit?

146) What is an ammeter?

147) Give the S.I. unit of electric current?

148) How is ammeter and voltmeter connected in a circuit?

149) What is a voltmeter?

150) Out of 60 W and 40 W lamps, which one has a higher electrical resistance when in use?

151) Give the unit of electric resistance

152) How is power related to current and voltage?

153) What is the S.I. unit of electric potential?

154) What is the advantage of the third wire of earth connection in domestic electric appliances?

155) Give the unit of power.

156) Which has a higher resistance: a 50 W lamp bulb or a 25 W lamp bulb and how many times?

157) What is the S.I. unit of charge?

158) An electric heater is used on 220 V supply and takes a current of 3.4 A. Calculate (i) its power and (ii) its power and (ii) its resistance when it is in use.

159) An electric lamp is marked 100 W, 220 V. It i used for 5 hours daily. Calculate.
(i) its reistance while glowing
(ii) energy consumed in kWh per day

160) (i) Draw a diagram to show how two resistor R_1 and R_2 are connected in series.
(ii) In a circuit, if the two resistors of 5 ohm and 10 ohm are connected in series, how does the current passing through the two resistors compare?

161) A bulb is rated at 5.0 volt, 100 mA. Calculate its
(i) power and
(ii) resistance

162) An electric iron has a rating of 750 W, 220 V. Calculate
(i) current passing through it, and
(ii) its resistance, when in use

163) Why is the current constant in series connection of circuit?

164) Calculate the electric energy consumed by 120 W toaster in 20 minutes.

165) Why is it not advisable to connect electric bulb and electric heater in series?

166) (a) Is a wire carrying current charged?
(b) Resistivities of copper, constantan and silver are 1.7 10^{-8} Ω m, 39.1× 10^{-8} Ω m, and 1.6 × 10 Ω m, respectively. Which has the best conductivity?

167) A wire is connected between the point P and O in the circuit to carry a current I. if it is a replaced by a wire of :
(i) Same length and half thickness
(ii) Half-length and same thickness how will the current vary?

168) (a) A large number of free electrons are present in metals. Why is there no current in the absence of electric field across it.
(b) V - I graphs for parallel and series combination of two metallic resistors. Which graph represents parallel combination? Justify your answer?

169) (a) A large number of free electrons are present in metals. Why is there no current in the absence of electric field across it.
(b) V-I graphs for parallel and series combination of two metallic resistors. combination? Justify your answer?

170) Should the resistance of an ammeter below or high? Give reason.

171) How does use of a fuse wire protect electric appliances?

172) What is electrical resistivity? In a series electrical circuit comprising a resistor made up of a metallic wire, the ammeter reads 5 A. The reading of the ammeter decreases to half when the length of the wire is doubled. Why?

173) What is the commercial unit of electrical energy? Represent it in terms of joules.

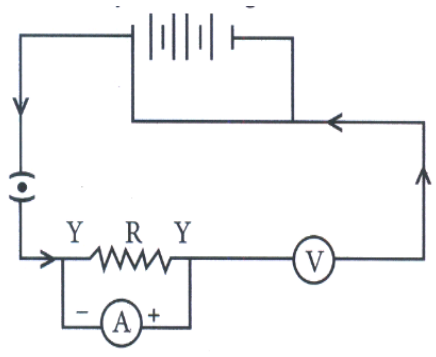
174) (a) A current of 1 ampere flows in a series circuit containing an electric lamp and a conductor of 5Ω when connected to a 10 V battery. Calculate the resistance of the electric lamp.
(b) Now if a resistance of 10Ω is connected in parallel with this series combination, what change in current flowing through 5Ω conductors and potential difference across the lamp will take place? Give reason.

175) Why is parallel arrangement used in domestic wiring?

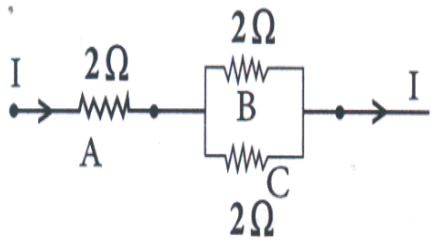
176) Should the heating element of an electric iron be made of iron, silver or nichrome wire?

177) A wire of resistance 10 ohm is bent in the form of a closed circle. What is the effective resistance between the two points at the ends of any diameter of the circle?

178) A child has drawn the electric circuit to study Ohm's law as shown in Figure. His teacher told that the circuit diagram needs correction. Study the circuit diagram and redraw it after making all the corrections.

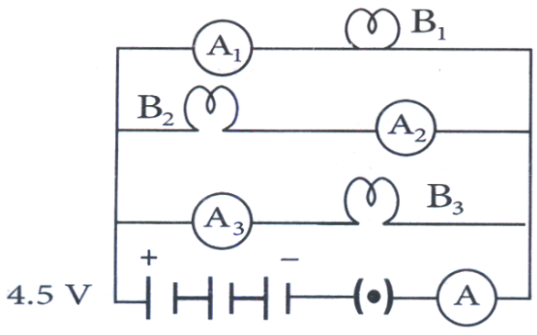


179) Three 2 Ω resistors, A, B and C, are connected as shown in Figure. Each of them dissipates energy and can withstand a maximum power of 18 W without melting Find the maximum current that can flow through the three resistors?



180) Draw a circuit diagram of an electric circuit containing a cell, a key, an ammeter, a resistor of 2 Ω in series with a combination of two resistors (4 Ω each) in parallel and a voltmeter across the parallel combination. Will the potential difference across the 2 Ω resistors to be the same as that across the parallel combination of 4 Ω resistor? Give reason

181) B_1, B_2 and B_3 three identical bulbs connected as shown in Figure when the entire three bulbs glow, a current of 3A is recorded by the ammeter A.



(i) What happens to the glow of the other two bulbs when the bulb B_1 gets fused?
(ii) What happens to the reading of A_1, A_2, A_3 and A when the bulb B_2 gets fused?
(iii) How much power is dissipated in the circuit when all the three bulbs glow together?

182) How is resistance, volt and current (I) related?

183) How is 1 ohm related to ampere and volt

184) What constitutes the current

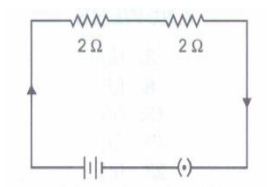
185) When the given resistances are connected in series, which physical quantity does not change.

186) What happens to the resistance when length of conductor is doubled without affecting the thickness of conductor

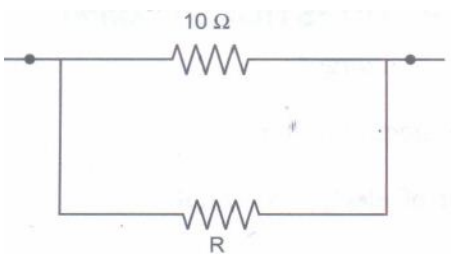
187) How many electrons are there in 1 C of charge?

188) What is the S.I. unit of resistivity

189) Find the total resistance in the given circuit



190) The combined resistance in the given circuit is 5Ω . What is the value of R?



191) What is the effective resistance in the given circuit?

192) A wire of resistance 4 Ω is bent in the form of a closed circle. What is the resistance between the two points at the ends of any diameter of the circle?

193) Give two points of difference between open circuit and closed circuit.

194) Give two points of difference between resistance and resistivity

195) Why are fairy decorative lights always connected in parallel

196) What is purely resistive electric circuit?

197) Give the difference in unit of electric energy and commercial unit of electric energy.

198) Define one watt hour and one kilowatt hour

199) Give two disadvantages of the heating effect of current.

200) Give two advantages of heating effect of electric current

201) Why do we prefer tungsten metal in electrical bulbs and why not some other metal of same resistivity can be used?

202) Name the factors on which Joule's law of heating depends

203) What is electric current? What is the conventional direction of electric current? Why was this direction taken to represent the flow of electric current?

204) What do the following symbols represent in the electric circuit?
$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{5} + \frac{1}{10} + \frac{1}{30} = \frac{1}{3}$

205) Write relation between heat energy produced in a conductor when a potential difference V is applied across its terminals and a current I flows through for 't'.

206) State difference between the wire used in the element of an electric heater and in a fuse wire.

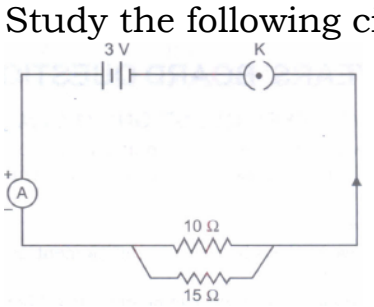
207) Two wires of equal lengths, one of copper and the other of manganin (an alloy) have the same thickness. Which one can be used for :
(i) electrical transmission lines,
(ii) electrical heating devices? Why?

208) The following table gives the value of electrical resistivity of same materials

Material	**Copper**	**Silver**	**Constantan**
Electrical resistivity (in Ω m)	1.6×10^{-8}	1.6×10^{-8}	49×10^{-8}

Which one is the best conductor of electricity out of them.

209) Study the following circuit and answer the questions that follows:



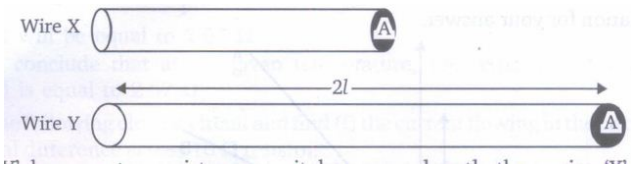
(a) State the type of combination of the two resistors in the circuit.
(b) How much current is flowing through
(i) 10Ω and
(ii) 15 Ω resistor?
(c) What is the ammeter reading?

210) Draw a schematic diagram of an' electric circuit consisting of a battery of two cells each of 1.5 V, 5 Ω , 10 Ω and 15 Ω resistor and a plug key, all connected in series.

211) Calculate resistance of an electric bulb which allows a 10 A current when connected to 220 V power source.

212) A lamp rated 100 W at 220 V is connected to the mains electric supply. What current is drawn from the supply line if the voltage is 220 V?

213) Out of the two wires X and Y shown below, which one has greater resistance? Justify your answer.



214) Define 1 volt. Express it in terms of SI unit of work and charge. Calculate the amount of energy consumed in carrying a charge of 1 coulomb through a battery of 3V

215) Why don't birds sitting on live wire get electric shock?

216) Why is the tungsten metal more coiled in the bulb and not installed in straight parallel wire form?

217) Name two solids and two liquid that are good conductors of electricity.

218) A student wish to verify Ohm's law in the lab. Make a list of the materials required for this experiment.

219) Before using the devices like ammeter and voltmeter for any experiment what are the two points to be kept in mind for consideration?

220) For finding the total resistance, when 3 resistors are connected in the series show how the voltmeter should be connected.

221) On connecting the 2 resistors, voltmeter, ammeter and key correctly to the battery the ammeter did not show any readings, what could be the errors and how can it be rectified?

222) To calculate the resultant resistance of two resistors when connected in parallel, show how the connection in the circuit should be made?

223) A student records the following four readings of the ammeter for the same circuit:
0.24A:,0.3A, 0.25A, 0.23A
Which reading should he omit if he has to keep only three readings for the record and justify your choice?

224) When you connect 3 resistors of same value in series and then in parallel in which case the current drawn in the circuit Will be more and why?

225) The graph of V - I is a straight line. Mention three conclusions one can draw from this graph.

226) Name and define the Sl unit of current.

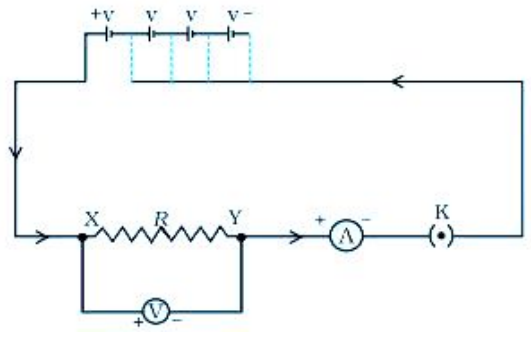
227) When two ends of a metallic wire are connected across the terminals of a cell, then some potential difference is setup between its ends. In which direction, electrons are flowing through the conductors?

228) Define resistance, Give its SI unit.

229) Two unequal resistances are connected in parallel. If you are not provided with any other parameters (e.g. numerical values of land R), what can be said about the voltage drop across the two resistors?

Activity Based Questions 6 x 2 = 12

230) 1. Set up a circuit as shown in



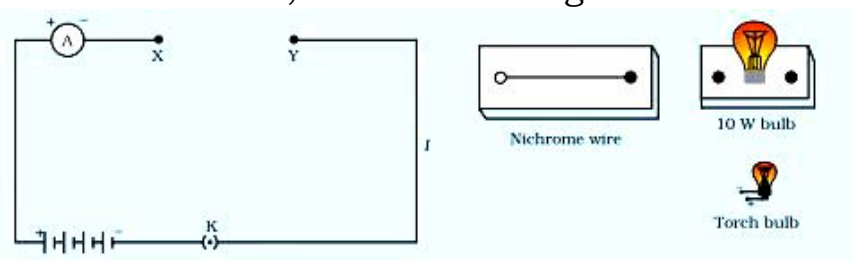
consisting of a nichrome wire XY of length, say 0.5 m, an ammeter, a voltmeter and four cells of 1.5 V each. (Nichrome is an alloy of nickel, chromium, manganese, and iron metals.)
2. First use only one cell as the source in the circuit. Note the reading in the ammeter I, for the current and reading of the voltmeter V for the potential difference across the nichrome wire XY in the circuit. Tabulate them in the Table given.
3. Next connect two cells in the circuit and note the respective readings of the ammeter and voltmeter for the values of current through the nichrome wire and potential difference across the nichrome wire.
4. Repeat the above steps using three cells and then four cells in the circuit separately.
5. Calculate the ratio of V to I for each pair of potential difference V and current I.

S.No.	Number of cells used in the circuit (ampere)	Current through the nichrome wire, I wire, V (volt)	Potential difference across the nichrome	V/I (volt/ampere)
1	1			
2	2			
3	3			
4	4			

6. Plot a graph between V and I, and observe the nature of the graph.

231) 1. Take a nichrome wire, a torch bulb, a 10 W bulb and an ammeter (0 - 5 A range), a plug key and some connecting wires.

2. Set up the circuit by connecting four dry cells of 1.5 V each in series with the ammeter leaving a gap XY in the circuit, as shown in Fig.



3. Complete the circuit by connecting the nichrome wire in the gap XY. Plug the key. Note down the ammeter reading. Take out the key from the plug. [Note: Always take out the key from the plug after measuring the current through the circuit.]

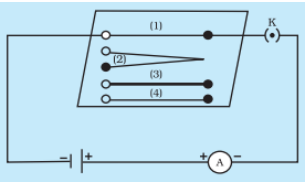
4. Replace the nichrome wire with the torch bulb in the circuit and find the current through it by measuring the reading of the ammeter.

5. Now repeat the above step with the 10 W bulb in the gap XY.

6. Are the ammeter readings differ for different components connected in the gap XY? What do the above observations indicate?

7. You may repeat this Activity by keeping any material component in the gap. Observe the ammeter readings in each case. Analyse the observations.

232) 1. Complete an electric circuit consisting of a cell, an ammeter, a nichrome wire of length l [say, marked (1)] and a plug key, as shown in Fig.



Circuit to study factors on which the resistance of conducting wires depends.

2. Now, plug the key. Note the current in the ammeter.

3. Replace the nichrome wire by another nichrome wire of same thickness but twice the length, that is 2l [marked (2) in the Fig.

4. Note the ammeter reading.

5. Now replace the wire by a thicker nichrome wire, of the same length l [marked (3)]. A thicker wire has a larger cross-sectional area. Again note down the current through the circuit.

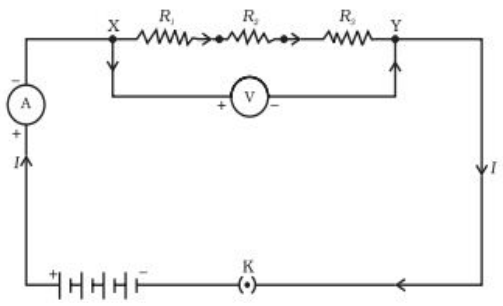
6. Instead of taking a nichrome wire, connect a copper wire [marked (4) in Fig.] in the circuit. Let the wire be of the same length and same area of cross-section as that of the first nichrome wire [marked (1)]. Note the value of the current.

7. Notice the difference in the current in all cases

8. Does the current depend on the length of the conductor?

9. Does the current depend on the area of cross-section of the wire used?

233) 1. Join three resistors of different values in series. Connect them with a battery, an ammeter and a plug key, as shown in Fig.



2. You may use the resistors of values like 1 Ω, 2 Ω, 3 Ω etc., and a battery of 6 V for performing this Activity.

3. Plug the key. Note the ammeter reading.

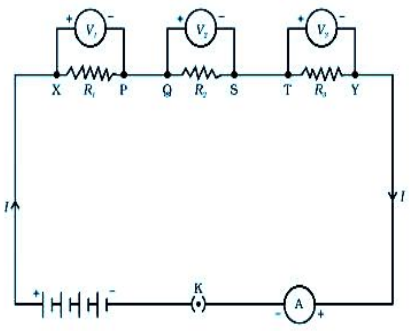
4. Change the position of ammeter to anywhere in between the resistors. Note the ammeter reading each time.

5. Do you find any change in the value of current through the ammeter?

234) 1. In Activity insert a voltmeter across the ends X and Y of the series combination of three resistors, as shown in Fig.

2. Plug the key in the circuit and note the voltmeter reading. It gives the potential difference across the series combination of resistors. Let it be V. Now measure the potential difference across the two terminals of the battery. Compare the two values.

3. Take out the plug key and disconnect the voltmeter. Now insert the voltmeter across the ends X and P of the first resistor, as shown in Fig.



4. Plug the key and measure the potential difference across the first resistor. Let it be V_1 .

5. Similarly, measure the potential difference across the other two resistors, separately. Let these values be V_2 and V_3 , respectively.

6. Deduce a relationship between V, V_1 , V_2 and V_3 .

235) 1. Make a parallel combination, XY, of three resistors having resistances R_1, R_2, and R_3, respectively. Connect it with a battery, a plug key and an ammeter, as shown in Fig.(a) Also connect a voltmeter in parallel with the combination of resistors.

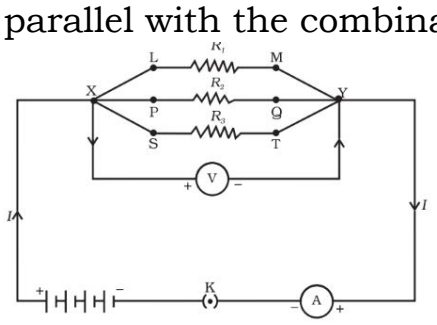
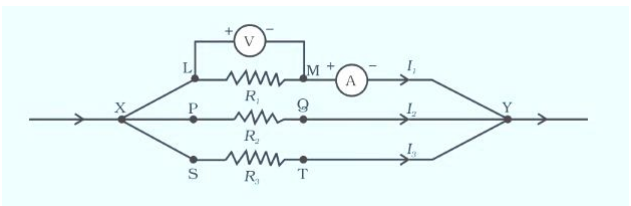


fig (a)

2. Plug the key and note the ammeter reading. Let the current be I. Also take the voltmeter reading. It gives the potential difference V, across the combination. The potential difference across each resistor is also V. This can be checked by connecting the voltmeter across each individual resistor (see Fig(a))

3. Take out the plug from the key. Remove the ammeter and voltmeter from the circuit. Insert the ammeter in series with the resistor R_1, as shown in Fig(b). Note the ammeter reading, I_1.



Fig(b)

4. Similarly, measure the currents through R_2 and R_3. Let these be I_2 and I_3, respectively. What is the relationship between I, I_1, I_2 and I_3?

3 Marks 40 x 3 = 120

236) The potential difference between the terminals of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is increased to 120 V?

237) The potential difference between the terminals of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is increased to 120 V?

238) Resistance of a metal wire of length 1 m is 26 Ω at 20°C. If the diameter of the wire is 0.3 mm, what will be the resistivity of the metal at that temperature? Using Table, predict the material of the wire.

	Material	**Resistivity (Ω m)**
Conductors	Silver	1.60×10^{-8}
	Copper	1.62×10^{-8}
	Aluminium	2.63×10^{-8}
	Tungsten	5.20×10^{-8}
	Nickel	6.84×10^{-8}
	Iron	10.0×10^{-8}
	Chromium	12.9×10^{-8}
	Mercury	94.0×10^{-8}
	Manganese	1.84×10^{-6}
Alloys	Constantan (alloy of Cu and Ni)	49×10^{-6}
	Manganin (alloy of Cu, Mn and Ni)	44×10^{-6}
	Nichrome (alloy of Ni, Cr, Mn and Fe)	100×10^{-6}
Insulators	Glass	$10^{10} - 10^{14}$
	Hard rubber	$10^{13} - 10^{16}$
	Ebonite	$10^{15} - 10^{17}$
	Diamond	$10^{12} - 10^{13}$
	Paper (dry)	10^{12}

239) A wire of given material having length l and area of cross-section A has a resistance of 4 Ω. What would be the resistance of another wire of the same material having length l/2 and area of cross-section 2A?

240) Two lamps, one related 60W at 220 W at 220V and the other 40 W at 220 V, are connected in parallel to the electric supply at 220V.
(a) Draw a circuit diagram to show the connections.
(b) Calculate the current drawn from the electric supply.
(c) Calculate the total energy consumed by the two lamps together when they operate for one hour.

241) (a) Distinguish between the terms "overloading and short circuiting" as used in domestic circuits.
(b) Why are the coils of electric toasters made of an alloy rather than a pure metal?

242) (a) What is meant by 'Electric Resistance' of a conductor?
(b) A wire of length 'L' and resistance 'R' is stretched so that its length is doubled and the area of cross-section is halved. How will its:
(i) resistance change
(ii) resistivity change

243) (a) State Ohm's Law.
(b) Draw a schematic diagram of the circuit for studying Ohm's Law.

244) (i) Draw a schematic diagram of a circuit consisting of a battery of five 2 V cells, a 5 Ohm resistor, a 10 Ohm resistor and a 15 Ohm resistor, and a plug key, all connected in series.
(ii) Calculate the electric current passing through the above circuit when the key is closed.

245) A touch bulb is rated 2.5 V and 750 mA. Calculate (i) its power, (ii) its resistance and (iii) the energy consumed if this bulb is lighted for four hours.

246) If a 12 V battery is connected to the arrangement of resistances given below, calculate
(i) the total effective resistance of the arrangement and
(ii) the total current flowing in the circuit

247) Differentiate between ammeter and voltmeter.

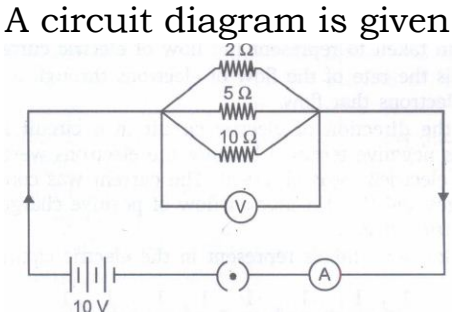
248) Give the differences between series and parallel connections of resistors.

249) Give differences between conductors and insulators.

250) What is potential difference? Explain and give its unit with definition.

251) How much work is done in moving a charge of 4 C across two points having potential difference of 12 V? Calculate the number of electrons flowing in it.

252) A circuit diagram is given below



calculate

(a) Current through each resistor.

(b) The total current in the circuit.

(c) the total effective resistance of the circuit.

Solution:

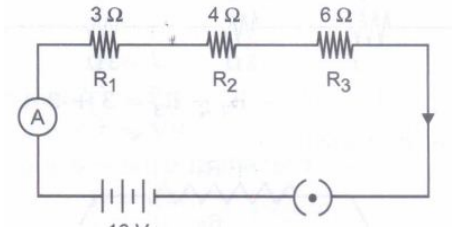
R1 = 2 Ω V = 10V

R2 = 5 Ω

R3 = 10 Ω

253) You are given 3 resistors each of 3 ohm and you are asked to get all possible values of resistance when you connect them in different combinations. How many values of resistance can you get?

254) A battery of 10 V is connected in a circuit with 3 0, 4 0, 6 0 resistors connected in series. How much current will flow through 6 0 resistor?



255) Two electric bulbs are rated 60 W, 220 V and 20 W, 220 V, are connected in parallel to a 220 V supply. Calculate the total electric current in the circuit.

256) An electric lamp draws a current of 0.3 ampere and is used for 6 hours every day for a month (30 days). Calculate the amount of charge that flows through the circuit every day and for a month.

257) Describe an activity to prove that resistance of a wire depends on its length, cross sectional area and material of the wire.

258) What is the heating effect of electric current? Find the expression for calculating 'Heat'.

259) A wire is 1.0 m long, 0.2 mm in diameter and has a resistance of 10 Ω . Calculate the resistivity of its material

260) Calculate the area of cross section of a wire of length 1.0 m, its resistance is 23 Ω and the resistivity of the material of the wire is 1.84×10^{-6} Ω m.

261) Ten bulbs are connected in a series circuit to a power supply line and ten identical bulbs are connected in a parallel circuit to an identical power supply line.

(a) Which circuit would have the highest voltage across each bulb?

(b) In which circuit would the bulb be brighter?

(c) If one bulb blows out, in which circuit will other bulb stop glowing?

(d) Which circuit would have less current in it?

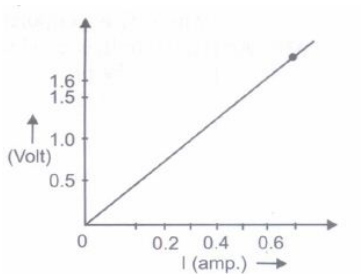
262) How much current will an electric bulb draw from 220 V source if the resistance of the bulb is 1200 Ω ? If in place of bulb, a heater of resistance 100 Ω is connected to the sources, calculate the current drawn by it.

263) Draw a schematic diagrams of an electric circuit comprising of 3 cells and an electric bulb, ammeter, plug-key in the ON mode and another with same components but with two bulbs in parallel and a voltmeter across the combination.

264) An electric bulb is rated at 60 W, 240 V. Calculate its resistance. If the voltage drops to 192 V, calculate the power consumed and the current drawn by the bulb. (Assume that the resistance of the bulb remain unchanged.)

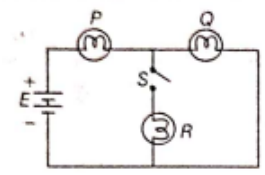
265) V-I graph for two wires A and B are shown in the figure. If both wires are of same length and same thickness, which of the two is made of a material of high resistivity? Give justification for your answer.

266) (i) Draw a closed circuit diagram consisting of a 0.5 m long nichrome wire XY; an ammeter, a voltmeter, four cells of 1.5 V each and a plug key.
(ii) Following graph was plotted between V and I values: What would be the values of V/1 ratios when the potential difference is 0.8 V, 1.2 V and 1.6 V respectively? What conclusion do you draw from these values?



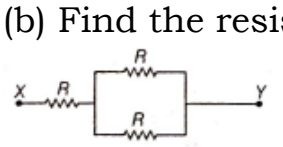
267) Give two points of difference between ammeter and voltmeter.

268) A battery E is connected to three Identical lamps P, Q and R as shown in figure. Initially, the switch S is kept open and the lamp P and Q are observed to glow with same brightness. Then, switch S Is closed.

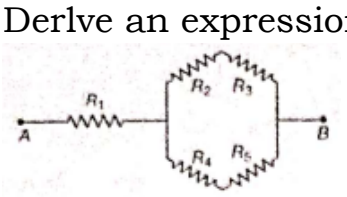


How will the brightness of glow of bulbs P and Q change? Justify your answer.
(i) State the relation between potential difference, work done and charge moved.
(ii) Calculate the work done in moving a charge of 4 C from a point at 220 V to a point at 230 V.

269) (a) State Ohm's law. Write formula for the equivalent resistance R_2 of the parallel combination of three resistors of values R_1, R_2 and R_3
(b) Find the resistance of the following network of resistance.



270) Derlve an expression for equivalent resistance in the following case



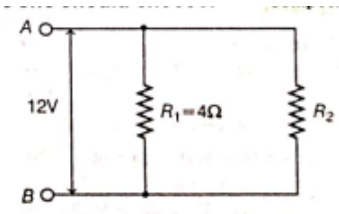
Decide which resistances are in series and parallel. Solve for series and then for parallel. Combine both the results to get the equivalent resistance.

271) List three advantage of parallel circuits in domestic wiring.

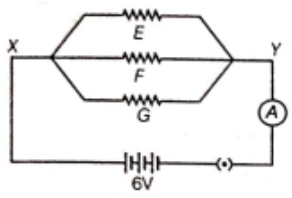
272) (i) What is the meaning of electric power of an electrical device? Write its SI unit.
(ii) An electric kettle of 2 kW is used for 2 h . Calculate the energy consumed in
(a) kilowatt hour and
(b) joules

273) Find the minimum resistance that can be made using five resistors each of $(1/5)\Omega$.

274) A student has two resistors 2Ω and 3Ω . She has to put one of them in place of R_2 as shown in the figure. The current that she needs in the entire circuit is exactly 9A. Show by calculation which of the two resistors she should choose.



275) Three resistors in a circuit are attached as shown below. The resistance of F and G are 10Ω and 5Ω, respectively. The resistance of E Is unknown. These resistors are connected to a battery with potential difference 6 V .



(i) What is the term used to describe such an arrangement of resistors?
(ii) What is the resistance of E if 0.3 A current flows through it?
(iii) What is the total current flowing in the circuit?

Case Study Questions 15 x 4 = 60

276) The rate of flow of charge is called electric current. The SI unit of electric current is Ampere (A). The direction of flow of current is always opposite to the direction of flow of electrons in the current.
The electric potential is defined as the amount of work done in bringing a unit positive test charge from infinity to a point in the electric field. The amount of work done in bringing a unit positive test charge from one point to another point in an electric field is defined as potential difference.
$V_{AB} = V_B - V_A = \frac{W_{BA}}{q}$
The SI unit of potential and potential difference is volt.

(i) The 2 C of charge is flowing through a conductor in 100 rns, the current in the circuit is
(a) 20 A **(b) 2 A**
(c) 0.2 A **(d) 0.02 A**

(ii) Which of the following is true?
(a) Current flows from positive terminal of the cell to the negative terminal of the cell outside the cell.
(b) The negative charge moves from lower potential to higher potential.
(c) The direction of flow of current in same as the direction of flow of positive charge.
(d) All of these

(iii) The potential difference between the two terminals of a battery, if 100 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery to other is
(a) 50 V **(b) -5 V**
(c) 0.5 V **(d) 500 V**

(iv) The number of electrons flowing per second in a conductor if 1A current is passing through it
(a) 6.25×10^{20} **(b) 6.25×10^{19}**
(c) $6.25 X 10^{18}$ **(d) 6.25×10^{-19}**

(v) The voltage can be written as
(a) Work done x charge x time **(b)** $\frac{\text{Work done}}{\text{Current} \times \text{time}}$
(c) $\frac{\text{Work done} \times \text{time}}{\text{Current}}$ **(d) Work done x charge**

277) The relationship between potential difference and current was first established by George Simon Ohm called Ohm's law. According to this law, the current through a metallic conductor is proportional to the potential difference applied between its ends, provided the temperature remain constant i.e. $I \propto V$ or $V = IR$; where R is constant for the conductor and it is called resistance of the conductor. Although Ohm's law has been found valid over a large class of materials, there do exist materials and devices used in electric circuits where the proportionality of V and I does not hold.

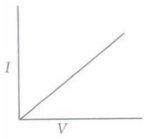
(i) If both the potential difference and the resistance in a circuit are doubled, then

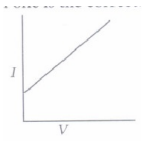
(a) current remains same **(b) current is doubled**

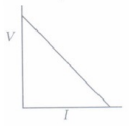
(c) current is halved **(d) current is quadrupled**

(ii) For a conductor, the graph between V and I is there. Which one is the correct?

(a) 

(b) 

(c) 

(d) 

(iii) The slope of V - I graph (V on x-axis and I on y-axis) gives

(a) resistance **(b) reciprocal of resistance**

(c) charge **(d) reciprocal of charge.**

(iv) When battery of 9 V is connected across a conductor and the current flows is 0.1 A, the resistance is

(a) 9 Ω **(b) 0.9 Ω**

(c) 90 Ω **(d) 900 Ω**

(v) By increasing the voltage across a conductor, the

(a) current will decrease **(b) resistance will increase**

(c) current will increase **(d) resistance will decrease.**

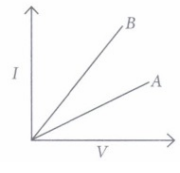
278) The obstruction offered by a conductor in the path of flow of current is called resistance. The SI unit of resistance is ohm (Ω). It has been found that the resistance of a conductor depends on the temperature of the conductor. As the temperature increases the resistance also increases. But the resistance of alloys like mangnin, constantan and nichrome is almost unaffected by temperature. The resistance of a conductor also depends on the length of conductor and the area of cross-section of the conductor. More be the length, more will be the resistance, more be the area of cross-section, lesser will be the resistance.

(i) Which of the following is not will desired in material being used for making electrical wires?

(a) High melting point **(b) High resistance**

(c) High conductivity **(d) None of these**

(ii) The V - I graph for two metallic wires A and B is given. What is the correct relationship between their temperatures?



(a) $T_A < T_B$ **(b) $T_A > T_B$**

(c) $T_A = T_B$ **(d) none of these**

(iii) Two wires of same material one of length L and area of cross-section A, other is of length 2L and area A/2 . Which of the following is correct?

(a) $R_1 = R_2$ **(b) $R_1 = 4R_2$**

(c) $R_2 = 4R_1$ **(d) $R_1 = 2R_2$**

(iv) For the same conducting wire

(a) resistance is higher in summer

(b) resistance is higher in winter

(c) resistance is same is summer or in winter

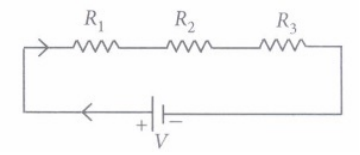
(d) none of these

(v) A wire of resistance 20 Ω is cut into 5 equal pieces. The resistance of each part is

(a) 4 Ω **(b) 10 Ω**

(c) 100 Ω **(d) 80 Ω**

279) Two or more resistances are connected in series or in parallel or both, depending upon whether we want to increase or decrease the circuit resistance.



The two or more resistances are said to be connected in series if the current flowing through each resistor is same. The equivalent resistance in the series combination is given by

$R_s = R_1 + R_2 + R_3$

(i) When three resistors are connected in series with a battery of voltage V and voltage drop across resistors is V_1, V_2 and V_3, which of the relation is correct?

(a) $V = V_1 = V_2 = V_3$ **(b) $V = V_1 + V_2 + V_3$**

(c) $V_1 + V_2 + V_3 = 3V$ **(d) $V > V_1 + V_2 + V_3$**

(ii) When the three resistors each of resistance R ohm, connected in series, the equivalent resistance is

(a) R/2 **(b) > R**

(c) < R/2 **(d) < R**

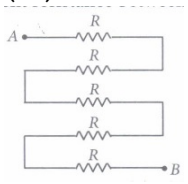
(iii) There is a wire oflength 20 cm and having resistance 20 Ω cut into 4 equal pieces and then joined in series.

The equivalent resistance is

(a) 20 Ω **(b) 4 Ω**

(c) 5 Ω **(d) 10 Ω**

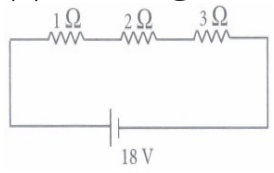
(iv) In the following circuit, find the equivalent resistance between A and B is (R = 2 Ω)



(a) 10 Ω **(b) 5 Ω**

(c) 2 Ω **(d) 4 Ω**

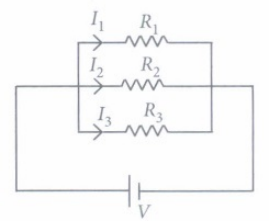
(v) In the given circuit, the current in each resistor is



(a) 3 A **(b) 6 A**

(c) 9 A **(d) 18 A**

280) If two or more resistances are connected in such a way that the same potential difference gets applied to each of them, then they are said to be connected in parallel. The. current flowing through the two resistances in parallel is, however, not the same. When we have two or more resistances joined in parallel to one another, then the same current gets additional paths to flow and the overall resistance decreases. The equivalent resistance is given by $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$



(i) Three resistances, 2 Ω , 6 Ω and 8 Ω are connected in parallel, then the equivalent resistance is

(a) less than 6 Ω but more than 2 Ω

(b) less than 8 Ω but more than 6 Ω

(c) less than 2 Ω

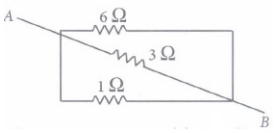
(d) more than 8 Ω

(ii) A wire of resistance 12 Ω is cut into three equal pieces and then twisted their ends together, the equivalent resistance is

(a) $\frac{3}{8}\Omega$ **(b)** $\frac{4}{3}\Omega$

(c) $\frac{3}{4}\Omega$ **(d)** $\frac{5}{6}\Omega$

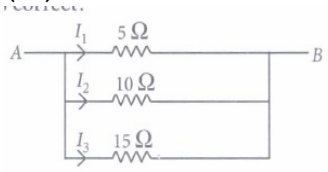
(iii) Three resistances are connected as shown. The equivalent resistance between A and B is



(a) $\frac{2}{3}\Omega$ **(b)** $\frac{3}{2}\Omega$

(c) $\frac{4}{3}\Omega$ **(d)** $\frac{3}{4}\Omega$

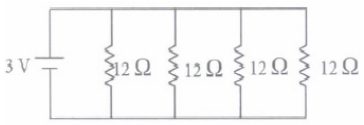
(iv) Which of the following relation is correct?



(a) $I_1 = 2I_2 = 3I_3$ **(b)** $I_1 = 4I_2 = 3I_3$

(c) $2I_1 = I_2 = 3I_3$ **(d)** $3I_1 = 2I_2 = I_3$

(v) Find the current in each resistance.



(a) 1 A **(b) 2 A**

(c) 3 A **(d) 0.25 A**

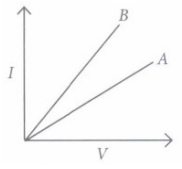
281) Several resistors may be combined to form a network. The combination should have two end points to connect it with a battery or other circuit elements. When the resistances are connected in series, the current in each resistance is same but the potential difference is different in each resistor. When the resistances are connected in parallel, the voltage drop across each resistance is same but the current is different in each resistor.

(i) The household circuits are connected in

(a) series combination **(b) parallel combination**

(c) both (a) and (b) **(d) none of these**

(ii) The two wires of each of resistance R, initially connected in series and then in parallel. In the graph it shows the resistance in series and in parallel. Which of the following is correct?



(a) A denotes parallel combination.

(b) B denotes series combination.

(c) A denotes series combination and B denotes parallel combination.

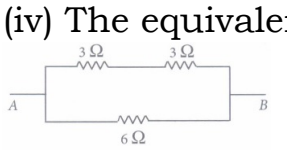
(d) None of these.

(iii) The equivalent resistance of r_1 and r_2, when connected in series is R_1 and when they are connected in parallel is R_2. Then the ratio is

(a) $\frac{r_1}{r_2}$ **(b)** $\frac{r_1+r_2}{r_1r_2}$

(c) $\frac{(r_1+r_2)^2}{r_1r_2}$ **(d)** $\frac{r_1r_2}{2r_1+2r_2}$

(iv) The equivalent resistance between A and B is



(a) 6 Ω **(b) 9 Ω**

(c) 3 Ω **(d) 12 Ω**

(v) Two resistances 10 Ω and 3 Ω are connected in parallel across a battery. If there is a current of 0.2 A in 10 .Q resistor, the voltage supplied by battery is

(a) 2 V **(b) 4 V**

(c) 1 V **(d) 8 V**

282) The heating effect of current is obtained by transformation of electrical energy in heat energy. Just as mechanical energy used to overcome friction is covered into heat, in the same way, electrical energy is converted into heat energy when an electric current flows through a resistance wire. The heat produced in a conductor, when a current flows through it is found to depend directly on (a) strength of current (b) resistance of the conductor (c) time for which the current flows.

The mathematical expression is given by $H = I^2Rt$.

The electrical fuse, electrical heater, electric iron, electric geyser etc. all are based on the heating effect of current.

(i) What are the properties of heating element?

(a) High resistance, high melting point

(b) Low resistance, high melting point

(c) Low resistance, high melting point

(d) Low resistance, low melting point.

(ii) What are the properties of electric fuse?

(a) Low resistance, low melting point

(b) High resistance, high melting point.

(c) High resistance, low melting point

(d) Low resistance, high melting point

(iii) When the current is doubled in a heating device and time is halved, the heat energy produced is

(a) doubled **(b) halved**

(c) four times **(d) one fourth times**

(iv) A fuse wire melts at 5 A. It is is desired that the fuse wire of same material melt at 10 A. The new radius of the wire is

(a) 4 times **(b) 2 times**

(c) $\frac{1}{2}$ times **(d)** $\frac{1}{4}$ times

(v) When a current of 0.5 A passes through a conductor for 5 min and the resistance of conductor is 10 Ω , the amount of heat produced is

(a) 250 J **(b) 5000J**

(c) 750J **(d) 1000J**

283) The electrical energy consumed by an electrical appliance is given by the product of its power rating and the time for which it is used. The SI unit of electrical energy is Joule. Actually, Joule represents a very small quantity of energy and therefore it is inconvenient to use where a large quantity of energy is involved. So for commercial purposes we use a bigger unit of electrical energy which is called kilowatt hour. 1 kilowatt-hour is equal to 3.6 x 106 joules of electrical energy.

(i) The energy dissipated by the heater is E. When the time of operating the heater is doubled, the energy dissipated is

(a) doubled **(b) half**

(c) remains same **(d) four times**

(ii) The power of a lamp is 60 W The energy consumed in 1 minute is

(a) 360J **(b) 36J**

(c) 3600J **(d) 3.6 J**

(iii) The electrical refrigerator rated 400 W operates 8 hours a day. The cost of electrical energy is ₹5 per kWh. Find the cost of running the refrigerator for one day?

(a) ₹32 **(b) ₹16**

(c) ₹8 **(d) ₹4**

(iv) Calculate the energy transformed by a 5 A current flowing through a resistor of 2 Ω for 30 minutes?

(a) 90 kJ **(b) 80 kJ**

(c) 60 kJ **(d) 40 kJ**

(v) Which of the following is correct?

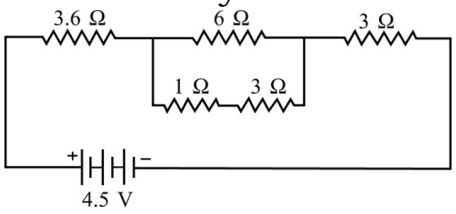
(a) 1 watt hour = 3600 J

(b) 1kWh = $36x10^6$J

(c) Energy (in kWh) = power (in W) x time (in hr)

(d) $\text{Energy (in kWh)} = \frac{V(\text{ volt})\times I(\text{ ampere})\times t(\text{ sec})}{1000}$

284) Shyam made one circuit for his Physics. He used five resistances: two 3Ω, one 1Ω, one 6Ω, one 3.6 Ω and a battery of 4.5 V. The circuit diagram is given below:



(i) Total resistance of parallel combination is :

(a) 2.4 Ω (b) 3 Ω (c) 6 Ω (d) 2 Ω

(ii) Equivalent resistance of total circuit is :

(a) 5 Ω (b) 9 Ω (c) 11 Ω (d) 13 Ω

(iii) Total current in the circuit is :

(a) 2 A (b) 4.5 A (c) 0.5 A (d) 10 A

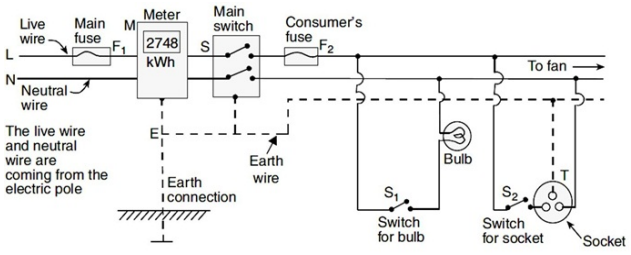
(iv) Current in 6 ohm resistance is

(a) 0.3 A (b) 0.2 A (c) 4 A (d) 6 A

(v) Potential across 3.6 ohm resistance will be :

(a) 1.8 V (b) 2.6 V (c) 9 V (d) 4.5 V

285) In household electric circuits, the mains supply is delivered to our homes using three core cable as shown here. The cable consists of three wires, live wire, neutral wire and earth wire. The live wire is at potential difference of 220 V for the domestic supply and the potential difference between live and neutral wire is 220 volts. The live wire is connected to electric meter through a fuse or a circuit breaker of higher rating. The neutral wire is connected directly to the electric meter.



(i) Potential difference between live and neutral wire is

(a) 1000 V (b) 100 V (c) 500 V (d) 220 V

(ii) Switches are connected in household circuit with which wire?

(a) Earth wire (b) Neutral wire (c) Live wire (d) None of these

(iii) What is usual current rating of the fuse wire in the line if electric iron, geysers, room heater etc. are in use?

(a) 15 A (b) 5 A (c) 10 A (d) 25 A

(iv) For all electrical appliances which property of circuit is recommended?

(a) Earthing (b) Neutralising

(c) Connecting with fuse (d) None of these

(v) Home circuit is connected in parallel because

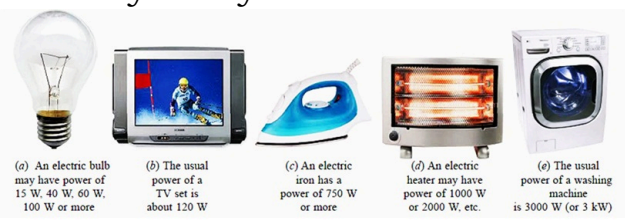
(a) in parallel circuit resistance is maximum

(b) in parallel circuit, if one device is damaged, then it does not affect other devices

(c) both of these

(d) none of these

286) Every electrical appliance like an electric bulb, radio or fan has a label or engraved plate on it which tells us the voltage (to be applied) and the electrical power consumed by it. The power rating of an electrical appliance tells us the rate at which electrical energy is consumed by the appliance. For example, a power rating of 100 watts on the bulb means that it will consume electrical energy at the rate of 100 joules per second. If we know the power P and voltage V of an electrical appliance, then we can very easily find out the current I drawn by it. This can be done by using the formula: P = V x I.



(*a*) An electric bulb may have power of 15 W, 40 W, 60 W, 100 W or more

(*b*) The usual power of a TV set is about 120 W

(*c*) An electric iron has a power of 750 W or more

(*d*) An electric heater may have power of 1000 W or 2000 W, etc.

(*e*) The usual power of a washing machine is 3000 W (or 3 kW)

(i) Which of the following does not represent electrical power in a circuit?

(a) I^2R (b) IR^2 (c) VI (d)V^2/R

(ii) An electric bulb is rated 220 V and 100 W. What is the resistance of the bulb?

(a) 448 Ω (b) 488 Ω (c) 484 Ω (d) 482 Ω

(iii) When the bulb in (ii) is operated on 110 V, the power consumed will be :

(a) 100 W (b) 75 W (c) 50 W (d) 25 W

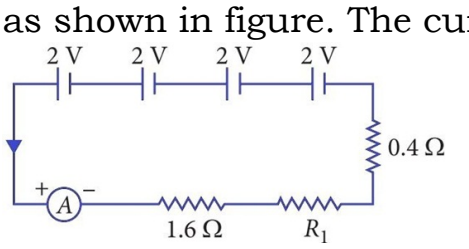
(iv) The commercial unit of energy is :

(a) watt (b) watt-hour (c) kilowatt-hour (d) kilo-joule

(v) What will be the current drawn by an electric bulb of 40 W when it is connected to a source of 220 V?

(a) 0.15 A (b) 0.18 A (c) 0.20 A (d) 0.24 A

287) A student is making his Physics project. He purchased four cells, an ammeter and three resistors for his project. In his project, Four cells each of emf 2 V are connected in series. The combination in series is joined to an ammeter of negligible resistance, a 1.6 Ω resistor, a 0.4 Ω resistor and unknown resistor R1 as shown in figure. The current in the circuit is 2 A.



(i) What is the value of R1?

(a) 1 Ω (b) 2 Ω (c) 4 Ω (d) 6 Ω

(ii) Find the value of potential difference across R1.

(a) 4 V (b) 2 V (c) 8 V (d) 12 V

(iii) Calculate the total resistance of the circuit.

(a) 3.75 Ω (b) 3.125 Ω (c) 3.5 Ω (d) 4 Ω

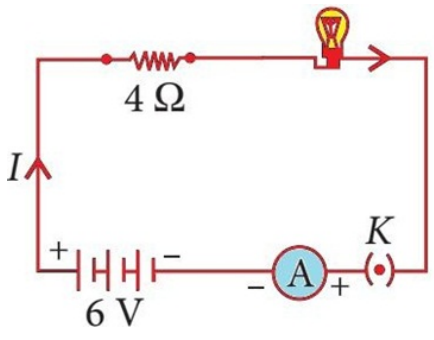
(iv) Find the value of current across resistor R1.

(a) 1.33 A (b) 0.25 A (c) 2 A (d) 3 A

(v) If one of the cell is removed, the current through 1.6 Ω will be

(a) 2 A (b) 1.5 A (c) 6 A (d) 0.25 A

288) An electric lamp is a device that produces visible light from electric current. It is the most common form of artificial lighting and is essential to modern society. An electric lamp of resistance 20 Ω and a conductor of resistance 4 Ω are connected to a 6 V battery as shown in the circuit.



(i) Find the total resistance of the circuit.

(a) 20 Ω (b) 4 Ω (c) 24 Ω (d) 12 Ω

(ii) Find the current through the circuit, is

(a) 0.25 A (b) 0.50 A (c) 1 A (d) 4 A

(iii) Find the potential difference across the electric lamp.

(a) 5 V (b) 10 V (c) 15 V (d) 20 V

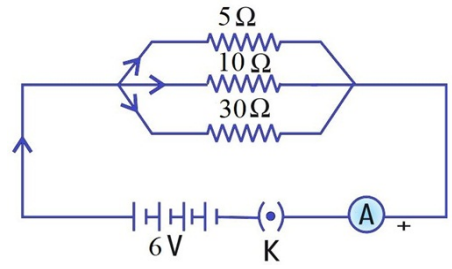
(iv) Find the potential difference across conductor.

(a) 0 V (b) 0.25 V (c) 0.5 V (d) 1 V

(v) Calculate power of the lamp.

(a) 2.0 W (b) 1.25 W (c) 0.25 W (d) 6.25 W

289) Aditya decided to complete his Physics Project. He purchased three resistors 5 Ω, 10 Ω and 30 Ω from the shop. Later he purchased a 6 V battery, switch (which works as key) and an ammeter to complete his circuit as shown below:



(i) Find the current through 5 Ω.

(a) 1.2 A (b) 1.5 A (c) 1 A (d) 2 A

(ii) Find the current through 10 Ω.

(a) 0.6 A (b) 0.2 A (c) 1 A (d) 0.5 A

(iii) Find the current through 30 Ω.

(a) 0.6 A (b) 0.2 A (c) 1 A (d) 0.5 A

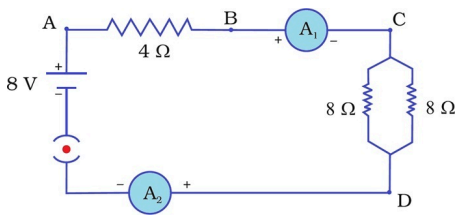
(iv) Find the total current in the circuit.

(a) 1.2 A (b) 1.5 A (c) 1 A (d) 2 A

(v) Find the total resistance of the circuit.

(a) 2 Ω (b) 4 Ω (c) 3 Ω (d) 5 Ω

290) Aditya decided to complete his Physics Project. He purchased three resistors 4 Ω, 8 Ω and 8 Ω from the shop. Later he purchased a 8 V battery, switch (which works as key) and two ammeters to complete his circuit as shown below:



(i) Find the effective resistance of two 8 resistors in the combination

(a) 2 Ω (b) 4 Ω (c) 3 Ω (d) 5 Ω

(ii) Find the current flowing through the circuit.

(a) 1.2 A (b) 1.5 A (c) 1 A (d) 2 A

(iii) Find the potential difference across 4 Ω resistance.

(a) 2 V (b) 3 V (c) 4 V (d) 5 V

(iv) Find the power dissipated in 4 Ω resistor

(a) 2 W (b) 3 W (c) 4 W (d) 5 W

(v) Find the difference in ammeter readings.

(a) 1 (b) 2 (c) 3 (d) No difference

5 Marks 52 x 5 = 260

291) An electric lamp, whose resistance is 20 Ω, and a conductor of 4 Ω resistance are connected to a 6 V battery (Fig). Calculate (a) the total resistance of the circuit, (b) the current through the circuit, and (c) the potential difference across the electric lamp and conductor.

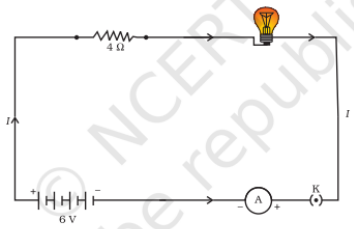
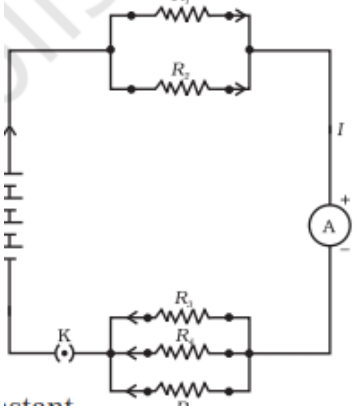


Figure 11.9 An electric lamp connected in series with a resistor of 4 Ω to a 6 V battery

292) In the circuit diagram given in Fig, suppose the resistors R_1, R_2 and R_3 have the values 5 Ω, 10 Ω, 30 Ω, respectively, which have been connected to a battery of 12 V. Calculate (a) the current through each resistor, (b) the total current in the circuit, and (c) the total circuit

293) If in Fig, R_1 = 10 Ω, R_2 = 40 Ω, R_3 = 30 Ω, R_4 = 20 Ω, R_5 = 60 Ω, and a 12 V battery is connected to the arrangement. Calculate (a) the total resistance in the circuit, and (b) the total current flowing in the circuit.



294) An electric iron consumes energy at a rate of 840 W when heating is at the maximum rate and 360 W when the heating is at the minimum. The voltage is 220 V. What are the current and the resistance in each case?

295) 100 J of heat is produced each second in a 4 Ω resistance. Find the potential difference across the resistor.

296) Three incandescent bulbs of 100 W each are connected in series in an electric circuit. In another circuit, another set of three bulbs of the same voltage are connected in parallel to the same source.
(a) Will the bulb in the two circuits glow with the same brightness? Justify your answer.
(b) Now let one bulb in both the circuits get fused. Will the rest of the bulbs continue to glow in each circuit? Give reason

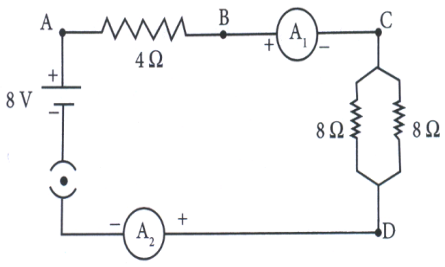
297) State Ohm's law? How can it be verified experimentally? Does it hold good under all conditions? Comment

298) How will you infer with the help of an experiment that the same current flows through every part of the circuit containing three resistances in series connected to a battery?

299) How will you conclude that the same potential difference exist across three resistors connected in a parallel arrangement to a battery?

300) Find out the following in the electric circuit given in figure
(a) Effective resistance of two 8Ω resistors in the combination
(b) Current flowing through 4Ω resistor.
(c) Potential difference across 4Ω resistance
(d) Power dissipated in 4Ω resistor.
(e) Difference in ammeter readings, if any.

301) Find out the following in the electric circuit given in Figure
(a) Effective resistance of two 8 Ω resistors in the combination
(b)Current flowing through 4 Ω resistor
(c) Potential difference across 8 Ω resistance
(d) Power dissipated in 4 Ω resistor
(e) Difference in ammeter readings, if any.



302) What is resistance of the conductors? Name two metals which offer very high resistance. Name the factors on which the resistance of the conductor depends.

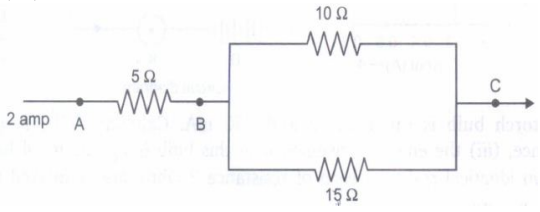
303) State Ohm's law. Draw a graph between voltage and current for a metallic conductor. Draw a circuit diagram of a circuit which consists of battery ammeter, voltmeter, resistor, rheostat and a key.

304) (a) Why is tungsten metal, not used in fuse wire but is used in bulb?
(b) Give one application of nichrome wire and state the reason for its use

305) (a) Why is series arrangement not used for domestic circuits?
(b) Explain why fuse wire is always connected in series arrangement.
(c) Why are copper and aluminium wires usually employed for electricity transmission

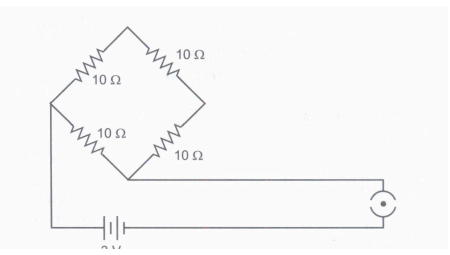
306) (a) A torch bulb is rated 2.5 V and 750 mA.
Calculate-
(i) its power,
(ii) its resistance,
(iii) the energy consumed if in this bulb is lighted for 4 hours.
(b) Two identical resistors, each of resistance 2 Ohm, are connected in torch
(i) in series and
(ii) in parallel, to a battery of 12 volts. Calculate the ratio of power consumed in two cases.

307) (i) Three resistors are connected as shown in the circuit diagram. Through the resistor 5 ohm, a current of 2 ampere is flowing.
(a) What is the current through the other two resistors?
(b) What is the p.d. across AB?
(c) What is the total resistance?
(ii) Can you change the set up and arrange the resistance in a manner to get the least resistance?



308) Study the following electric circuit and find
(i) the current flowing in the circuit and
(ii) the potential difference across 10 Ω resistor.

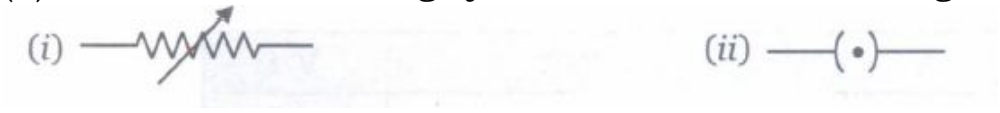
309) Find the current drawn from the battery by the network of four resistors shown in the figure



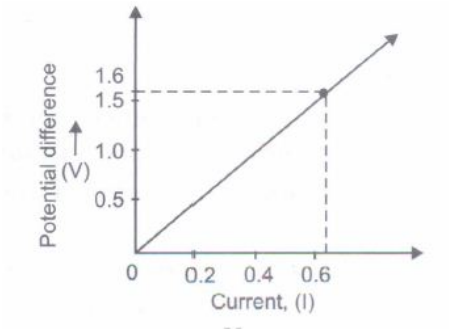
310) For the circuit shown in the diagram given below: Calculate:
(a) the value of current through each resistor.
(b) the total current in the circuit.
(c) the total effective resistance of the circuit

311) (a) What is meant by saying that potential difference between two points is 1 volt?. Name a device that helps to measure the potential difference across a conductor .
(b) Why does the connecting cord of an electric heater not glow hot while the heating element does?
(c) Electrical resistivities of some substances at 20°C are given below:
Silver $1.6 \times 10^{-8}\ \Omega$ m
Copper $1.62 \times 10^{-8}\ \Omega$ m
Tungsten $5.20 \times 10^{-8}\ \Omega$ m
Iron $10.0 \times 10^{-8}\ \Omega$ m
Mercury $94.0 \times 10^{-8}\ \Omega$ m
Nichrome $100 \times 10^{-6}\ \Omega$ m.
Answer the following questions in relation to them:
(i) Among silver and copper, which one is better conductor?
(ii) Which material would you advice to be used in electrical heating devices? Why?

312) (a) Name an instrument that measures electric current in a circuit. Define the unit of electric current.
(b) What do the following symbols mean in circuit diagram?

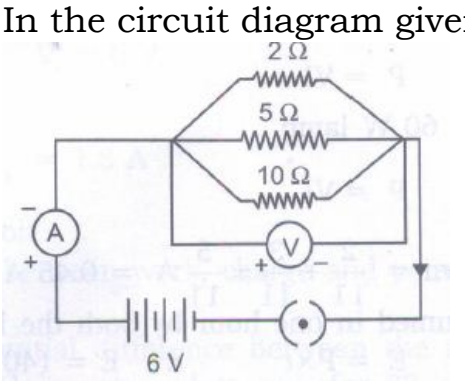


(c) An electric circuit consisting of a 0.5 m long nichrome wire, an ammeter, a voltmeter, four cells of 1.5 V each and a plug key was set up.
(i) Draw a diagram of the electric circuit to study the relation between the potential difference maintained between the points 'X' and 'Y' and the electric current flowing through XY.
(ii) Following graph was plotted between V and I values:



What would be the values of $\frac{V}{I}$ ratios when the potential difference is 0.8 V, 1.2 V and 1.6 V respectively? What conclusion do you draw from these values?

313) In the circuit diagram given below:



Calculate:
(a) the current through each resistor.
(b) the total current in the circuit.
(c) the total effective resistance of the circuit.

314) A piece of wire of resistance 20 Ω is drawn out so that its length is increased to twice its original length. Calculate the resistance of the wire in the new situation.

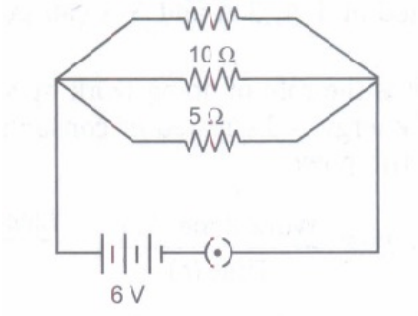
315) Two resistors with resistance 5 Ω and 10 Ω respectively are to be connected to a battery of emf 6 V so as to obtain:
(i) minimum current flowing, (ii) maximum current flowing:
(a) How will you connect the resistance in each case?
(b) Calculate the strength of the total current in the circuit in the two cases

316) (a) Define the term 'Volt'.
(b) State the relation between work, charge and potential difference for an electric circuit.
Calculate the potential difference between the two terminals of a battery if 100 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery of the other.

317) (a) Though same current flows through the electric line wires and the filament of bulb, yet only the filament glows. Why?
(b) The temperature of the filament of bulb is 2700°C when it glows. Why does it not get burnt up at such high temperature?
(c) The filament of an electric lamp, which draws a current of 0.25 A is used for four hours. Calculate the amount of charge flowing through the circuit.
(d) An electric iron is rated 2 kW at 220 V. Calculate the capacity of the fuse that should be used for the electric iron.

318) (a) Calculate the resistance of 1 km long copper wire of radius 1 mm. Resistivity of the copper is 1.72 x 10^{-8} Ω m.
(b) Draw a schematic diagram of a circuit consisting of a battery of 4 cells of 2V each connected to a key, an ammeter and two resistors of 2 Ω and 3 Ω respectively in series and a voltmeter to measure potential difference across 3 Ω .

319) Two wires A and B are of equal length and have equal I resistance. If the resistivity of A is more than that of B which wire is thicker and why? For the electric circuit given below calculate:



(i) Current in each resistor,
(ii) Total current drawn from the battery, and
(iii) Equivalent resistance of the Circuit

320) (a) Define electric power. Express it in terms of potential difference V and resistance R.
(b) An electrical fuse is rated at 2 A. What is meant by this statement?
(c) An electric iron of 1 kW is operated at 220 V. Find which of the following fuses that respectively rated at 1 A, 3 A and 5 A can be used in it.

321) What is meant by electric current? Name and define its SI unit. In a conductor, electrons are flowing from B to A. What is the direction of conventional current? Give justification for your answer.
A steady current of 1 ampere flows through a conductor. Calculate the number of electrons that flows through any section of the conductor in 1 second. (Charge on electron 1.6 x 10^{-19} coulomb).

322) (i) How will you infer with the help of an experiment that the same current flows through every part of the circuit containing three resistors R_1,R_2 and R_3 in series connected to a battery of V volts?
(ii) Study the following circuit and find out the (a) current in 12Ω resistor.