19. (a) A student is unable to see the words written on the blackboard placed at a distance of approximately 5 m from him clearly. Name the defect of vision the student is suffering from. State the possible causes of this defect and explain in brief the method of correcting this defect.

(b) Why does the Sun appear reddish during sunrise and sunset ? Will this phenomenon be observed by an astronaut on the moon ? Give reasons to justify your answer. 5

Chapter 12 : Electricity

1. When a 4V battery is connected across an unknown resistor there is a current of 100 mA in the circuit. The value of the resistance of the resister is:

i) 4 Ω
ii) 40 Ω
iii) 400 Ω
iv) 0.4 Ω

2. Unit of electric power may also be expressed as: 1

i) volt-ampere
ii) kilowatt-hour
iii) watt-second
iv) joule-second

3. At the time of short circuit, the electric current in the circuit :

(a) vary continuously (b) does not change
(c) reduces substantially (d) increases heavily 1

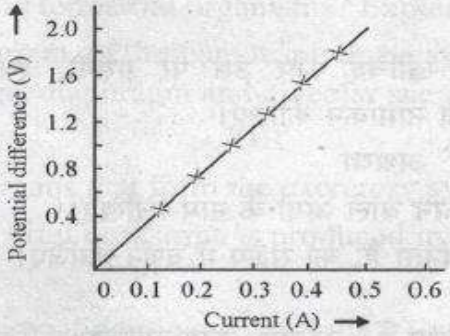
4. Two bulbs of 100 W and 40 W are connected in series. The current through the 100 W bulb is 1 A. The current through the 40 W bulb will be :

(a) 0.4 A (b) 0.6 A
(c) 0.8 A (d) 1 A 1

5. (a) Write the mathematical expression for Joule's law of heating.

(b) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40 V. 3

6. A V-I graph for a nichrome wire is given below. What do you infer from this graph? Draw a labelled circuit diagram to obtain such a graph. 3



7. (i) Consider a conductor of resistance 'R', length 'L', thickness 'd' and resistivity 'ρ'. Now this conductor is cut into four equal parts. What will be the new resistivity of each of these parts? Why? 5

(ii) Find the resistance if all of these parts are connected in:

(a) Parallel

(b) Series

(iii) Out of the combinations of resistors mentioned above in the previous part, for a given voltage which combination will consume more power and why?

8. The maximum resistance which can be made using four resistors each of 2 Ω is

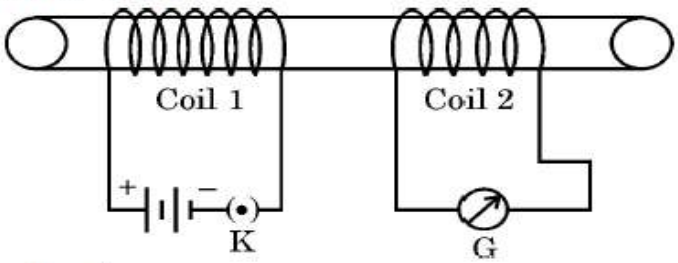
(a) 2 Ω

(b) 4 Ω

(c) 8 Ω

(d) 16 Ω 1

9. Two coils of insulated copper wire are wound over a non-conducting cylinder as shown. Coil 1 has comparative large number of turns. State your observations, when

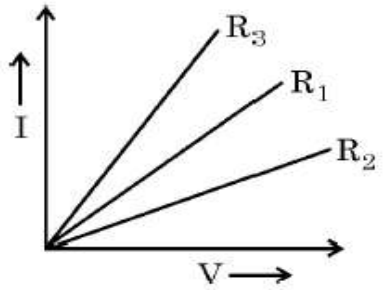


(i) Key K is closed.

(ii) Key K is opened.

Give reason for each of your observations. 3

10. A student plots V-I graphs for three samples of nichrome wire with resistances R_1, R_2 and R_3. Choose from the following the statement that holds true for this graph.



(a) $R_1 = R_2 = R_3$

(b) $R_1 > R_2 > R_3$

(c) $R_3 > R_2 > R_1$

(d) $R_2 > R_1 > R_3$ **1**

11. (a) Find the ratio of resistances of two copper rods X and Y of lengths 30 cm and 10 cm respectively and having radii 2 cm and 1 cm respectively.

(b) A current of 500 mA flows in a series circuit containing an electric lamp and a conductor of 10 Ω when connected to 6 V battery. Find the resistance of the electric lamp. **5**

12. The maximum resistance which can be made using four resistors each of resistance $\frac{1}{2}$ Ω is

(a) 2 Ω

(b) 1 Ω

(c) 2.5 Ω

(d) 8 Ω **1**

13. 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

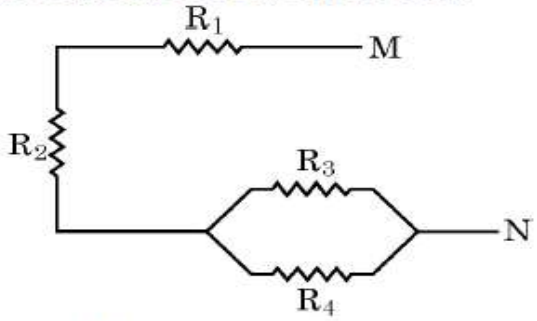
(a) $\frac{A}{2}$

(b) $\frac{3A}{2}$

(c) 2A

(d) 3A **1**

14. (a) For the combination of resistors shown in the following figure. find the equivalent resistance between M & N.



(b) State Joule's law of heating.

(c) Why we need a 5 A fuse for an electric iron which consumes 1 kW power at 220 V ?

(d) Why is it impracticable to connect an electric bulb and an electric heater in series ? **5**

15. If a person has five resistors each of value $\frac{1}{5}$ Ω, then the maximum resistance he can obtain by connecting them is *1*

(A) 1 Ω

(B) 5 Ω

(C) 10 Ω

(D) 25 Ω

16. The resistance of a resistor is reduced to half of its initial value. In doing so, if other parameters of the circuit remain unchanged, the heating effects in the resistor will become *1*

(A) two times.

(B) half.

(C) one-fourth.

(D) four times.

17. Draw a schematic diagram of a circuit consisting of a battery of 3 cells of 2 V each, a combination of three resistors of 10 Ω, 20 Ω and 30 Ω connected in parallel, a plug key and an ammeter, all connected in series. Use this circuit to find the value of the following :

(a) Current through each resistor

(b) Total current in the circuit

(c) Total effective resistance of the circuit *5*

18. Two identical resistors, each of resistance 15 Ω, are connected in (i) series, and (ii) parallel, in turn to a battery of 6 V. Calculate the ratio of the power consumed in the combination of resistors in each case. *5*

19. A cylindrical conductor of length '*l*' and uniform area of cross-section 'A' has resistance 'R'. Another conductor of length 2·5 *l* and resistance 0·5 R of the same material has area of cross-section *1*

(A) 5 A

(B) 2·5 A

(C) 0·5 A

(D) $\frac{1}{5}$ A

20. (a) Two lamps rated 100 W, 220 V and 10 W, 220 V are connected in parallel to 220 V supply. Calculate the total current through the circuit.

(b) Two resistors X and Y of resistances 2 Ω and 3 Ω respectively are first joined in parallel and then in series. In each case the voltage supplied is 5 V.

(i) Draw circuit diagrams to show the combination of resistors in each case.

(ii) Calculate the voltage across the 3 Ω resistor in the series combination of resistors. *5*

21. Two resistors A and B of resistances 10 Ω and 40 Ω respectively are first joined in series and then in parallel with two terminals of a battery. In each case the voltage applied is 5 V.

(a) Find the ratio of currents through the resistors A and B (i.e. I_A/I_B) in each case.

(b) Find the ratio of voltages across the resistors A and B (i.e. V_A/V_B) in each case.

(c) Find the heat produced each second in the series combination of resistors. *5*

22. (a) Define the term Potential Difference and state its SI unit.

(b) Name a device that helps to (i) maintain a potential difference across a resistor, and (ii) change current flowing through a resistor.

(c) Calculate the (i) highest, and (ii) lowest resistance that can be obtained by the combination of three resistors of resistances 20 Ω, 30 Ω and 60 Ω. *5*