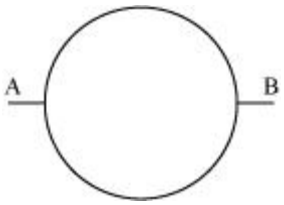
Current Electricity

Q.No.1:
A wire of resistance 8R is bent in the form of a circle. What is the effective resistance between the ends of a diameter AB?



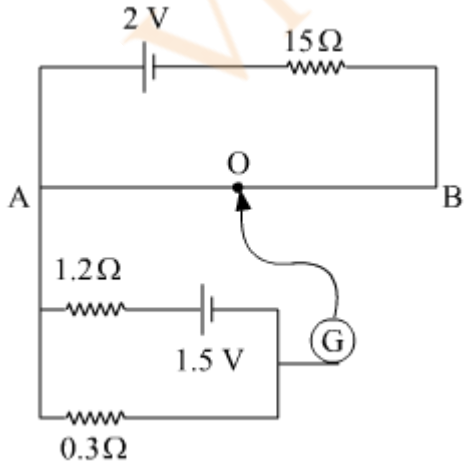
CBSE Board Paper 2010

Q.No.2: (i) Define the term drift velocity.
(ii) On the basis of electron drift, derive an expression for resistivity of a conductor in terms of number density of free electrons and relaxation time. On what factors does resistivity of a conductor depend?
(iii) Why alloys like constantan and manganin are used for making standard resistors?

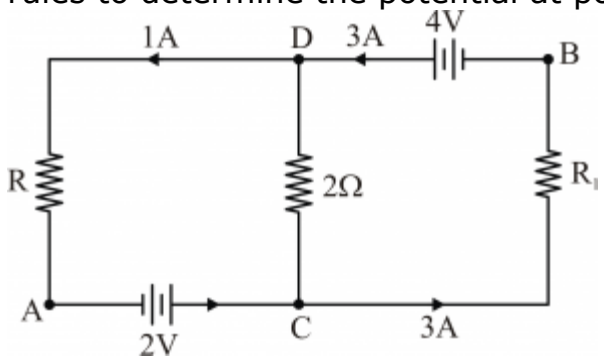
OR

(i) State the principle of working of a potentiometer.
(ii) In the following potentiometer circuit, AB is a uniform wire of length 1 m and resistance 10 Ω. Calculate the potential gradient along the wire and balance length AO (= *l*).

CBSE Board Paper 2016



Q.No.3:
In the given circuit, assuming point A to be at zero potential, use Kirchhoff's rules to determine the potential at point B.



CBSE Board Paper 2011

Q.No.4:
Two heating elements of resistances R_1 and R_2 when operated at a constant supply of voltage, V, consume powers P_1 and P_2 respectively. Deduce the expressions for the power of their combination whey they are, in turn, connected in (i) series and (ii) parallel across the same voltage supply.

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Q.No.5:
(a) State the working principle of a potentiometer. With the help of the circuit diagram, explain how a potentiometer is used to compare the emf's of two primary cells. Obtain the required expression used for comparing the emfs.
(b) Write two possible causes for one sided deflection in a potentiometer experiment.
OR
(a) State Kirchhoff's rules for an electric network. Using Kirchhoff's rules, obtain the balance condition in terms of the resistances of four arms of Wheatstone bridge.
(b) In the meterbridge experimental set up, shown in the figure, the null point 'D' is obtained at a distance of 40 cm from end A of the meterbridge wire. If a resistance of 10Ω is connected in series with R_1, null point is obtained at AD = 60 cm. Calculate the values of R_1 and R_2.

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Q.No.6:
A 5 V battery of negligible internal resistance is connected across a 200 V battery and a resistance of 39Ω as shown in the figure. Find the value of the current in circuit.

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Q.No.7:
A heating element is marked 210 V, 630 W. Find the resistance of the element when connected to a 210 V dc source.

CBSE Board Paper 2013

Q.No.8:
When electrons drift in a metal from lower to higher potential, does it mean that all the free electrons of the metal are moving in the same direction?

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Q.No.9:
Show on a graph, the variation of resistivity with temperature for a typical semiconductor.

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Q.No.10:
A cell of emf E and internal resistance r is connected to two external resistance R_1 and R_2 and a perfect ammeter. The current in the circuit is measured in four different situations:
(i) without any external resistance in the circuit
(ii) with resistance R_1 only
(iii) with R_1 and R_2 in series combination
(iv) with R_1 and R_2 in parallel combination
The currents measured in the four cases are 0.42 A, 1.05 A, 1.4 A and 4.2 A, but not necessarily in the order. Identify the currents corresponding to the four cases mentioned above.

CBSE Board Paper 2012

Q.No.11: Define the term 'drift velocity' of charge carriers in a conductor and write its relationship with the current flowing through it.

CBSE Board Paper 2014