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SOLUTION

Section – A

1. (i) (a & d) (ii) (a) live wire
(iii) (a) gets reversed in direction (iv) (d)
(v) (c) (vi) (b)
(vii) (a) (viii) (a) y-radiation
(ix) (d) Alpha (x) (a) zero

Section – B

2. (i) (a) Resistance of upper arm = 8 Ω

less total resistance is R

$$\therefore \frac{1}{R}=\frac{1}{8}+\frac{1}{8}=\frac{2}{8}$$

$$\frac{1}{R}=\frac{1}{4} \Rightarrow R=4\Omega$$

(b) P = 1000 W, V = 230 volt.

W.K.T. $P=\frac{V}{R}=\frac{(230)^2}{R}$

$\Rightarrow$ $1000=\frac{(230)^2}{R}$

$\Rightarrow$ $R=\frac{52900}{1000}$

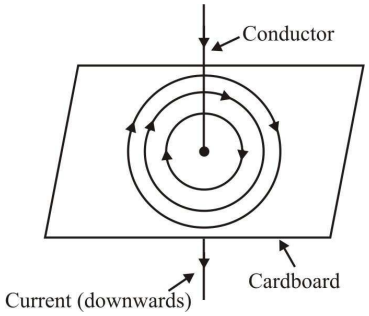
$R = 52.9\ \Omega$

(ii) (a) When 1 joule of work is done in bringing 1 coulomb of charge from 1.2 other point then the potential difference between 2 point is set to 1 volt.

(b) When current is drawn from a cell i.e. when the cell is in close circuit the potential difference between the electrode of the cell is known as it terminate voltage.

(iii) (a) Pattern : Concentric circles whose centres lie on the conductor.

Direction of magnetic field lines :- Clockwise.



(b) The arrangement of iron fillings remains uncharged, but they become dense and get arranged up to a larger distance from the conductor due to increasing the strength of current.

(c) **Right hand thumb rule:** We hold the current carrying conductor in right hand such that the thumb points in the direction of flow of current, then the fingers encircle the wire in the direction of magnetic field lines.

3. (i) (a) Electromagnetic induction is the phenomenon in which an e.m.f. is induced in the coil if there is a change in the magnetic flux linked with the coil.

(b) (i) change in magnetic flux.

(ii) the time in which the magnetic flux changes.

(ii) (a) $Q = 5000J$, $\Delta t = 10^oC = 10\ K$

$\therefore$ Heat capacity, $c' = \dfrac{\Delta Q}{\Delta t}$

$= \dfrac{5000\,J}{10\,K}$

$c' = 500\ J\ K^{-1}$

(b) Let, final temperature of water by t^oC fall in temperature of hot water = $(80 - t)^oC$

Rise in temp. of cold water = $(t - 25)^oC$

According to principle of calorimetry

Heat lost by hot water = Heat energy gained by cold water

$2 \times C \times (80 - t) = 8 \times C \times (t - 25)$

$\Rightarrow$ $2C\ (80 - t) = 8C\ (t - 25)$

$\Rightarrow$ $160 - 2t = 8t - 200$

$\Rightarrow$ $10t = 360$

$\Rightarrow$ $t = 36^oC$

Thus, final temp. will be 36^oC.

(iii) (a) boiling point is 150^oC

(b) The region DE represents freezing of the substance when the liquid changes into solid at a constant temp. ($=100^oC$)

(c) The melting point is 100^oC.

(d) Heat energy released per second = 100 J

time taken in condensation = $(20 - 5)s = 15$ sec

$\therefore$ latent heat of vaporisation = 100×15

$= 1500\ J$

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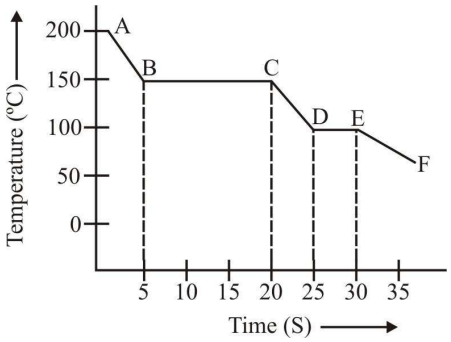


4. (i) (a) The minimum amount of energy required to emit electrons from a metal surface is called the work function.

(b) (i) No. of neutrons = Mass number – atomic number

$= 15 - 7$

$= 8$

(ii) The nucleus P can be written as ${}^{15}_{7}P$.

(ii) (a) The process of spontaneous emission of α, β and γ-radiations from the nuclei of atoms during their decay is called radioactivity.

(b) The radioactive material after it's use is known as nuclear waste.

(c) It must be buried in the specially constructed deep underground stores made quite far from the populated area.

(iii) (a) Electrons

(b) -1.6×10^{-19} C

(c) 1000 V

(d) The beam will get deflected towards the plate A.

5. (i) (a) $I_1 = 2A$ when $R_1 = 5\Omega$

from relation

$\varepsilon = I(R + r)$

$\varepsilon = 2(5 + r)$ ....(1)

Now, $I_2 = 1.2$ A when $R_2 = 9\Omega$

$\varepsilon = 1.2(9 + r)$ ....(2)

from eqn. (1) eq (2)

$2(5 + r) = 1.2(9 + r)$

$\Rightarrow \quad 10 + 2r = 10.8 + 1.2r$

or $\quad 2r - 1.2r = 10.8 - 10$

$\Rightarrow \quad r = \dfrac{0.8}{0.8}$

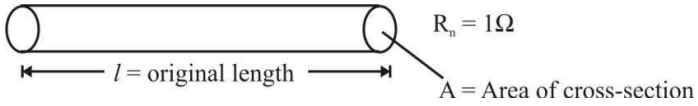
$r = 1\Omega$

from eqn. (i), $\varepsilon = 2(5 + 1) = 2 \times 6 = 12$ volt

$\varepsilon = 12V$

(b) ohmic resistors are those resistors which obey's ohm's law.
for eg. nichrome, copper sulphate solution.

(ii) (a)

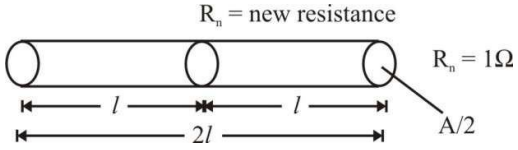


from $p = \frac{R_1 \times A}{\ell}$ (p = resistivity of wire)

$$p = \frac{1 \times A}{\ell}$$

$$p = \frac{A}{\ell} \quad \text{....(i)}$$

Now,



Now, $p = \frac{R_n \times \left(\frac{A}{2}\right)}{2\ell}$ ....(ii)

from (i) and (ii)

$$\frac{A}{\ell} = \frac{R_n \times A}{4\ell}$$

$\Rightarrow$ Rn = 4Ω (New resistance)

(b) 1 watt hour = 1 watt × 1 hour
= 1 W × (60 × 60) s
= 3600 J

1 W-hr – 3600 J

(iii) (a) live, neutral and earth.

(b) live and earth.

(c) earth

(d) live