DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth
DATE :

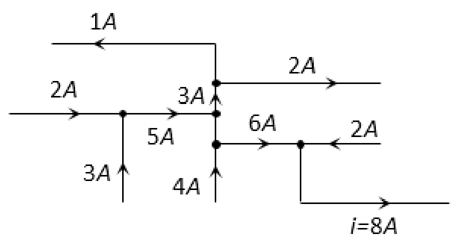
Solutions

SUBJECT : PHYSICS
DPP NO. : 8

Topic :- Current Electricity

1 **(b)**

By using Kirchhoff's junction law as shown below



We get $i = 8A$

2 **(a)**

$I = \frac{dq}{dt} = 3t^2 + 2t + 5$

$\therefore dq = (3t^2 + 2t + 5)dt$

$\therefore q = \int_{t=0}^{t=2} (3t^2 + 2t + 5)dt$

$= \frac{3t^3}{3} + \frac{2t^2}{2} + 5t\Big|_0^2 = t^3 + t^2 + 5t\Big|_0^2 = 22\ C$

3 **(a)**

$\frac{i}{i_g} = \frac{G+S}{S} \Rightarrow \frac{i_g}{i} = \frac{S}{G+S} = \frac{2.5}{27.5} = \frac{1}{11}$

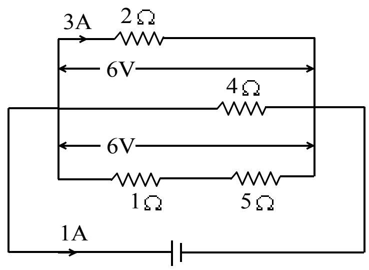
4 **(b)**

Current flowing through 2Ω resistance is $3A$, so P.D. across it is $3 \times 2 = 6V$

Current through the bottom line $= \frac{6}{1+5} = 1A$

$\therefore$ Power dissipated in 5Ω resistance is

$P = i^2R = (1)^2 \times 5 = 5W$



5 **(a)**

We know that thermoelectric power

$S = \frac{dE}{dT}$

Given, $E = K(T - T_r)\left[T_0 - \frac{1}{2}(T + T_r)\right]$

By differentiating the above equation w.r.t. T and putting $T = \frac{1}{2}T_0$, we get $S = \frac{1}{2}kT_0$

6 **(d)**

Three resistances are in parallel,

$\therefore \ \frac{1}{R'} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R} = \frac{3}{R}$

The equivalent resistance

$R' = \frac{R}{3}\Omega = \frac{6}{3} = 2\Omega$

8 **(a)**

Internal resistance of the cell

$r = \left[\frac{E}{V} - 1\right]R$

$r = \left[\frac{1.5}{1.4} - 1\right]14 = 1\Omega$

9 **(c)**

From Kirchhoff's second law

$V = \sum ir$ (for closed mesh)

Where V is potential difference, i the current and r the resistance.

$\therefore \ E + E = Ir + Ir = 2Ir$

or $I = \frac{E}{r}$ ....(i)

$V_x - V_y = E - Ir$

Putting the value of I from Eq (i), we get

$V_x - V_y = E - \frac{E}{r} \times V = 0$

10 **(c)**

Here, $\frac{P}{Q}=\frac{2}{3}$

we know

$\frac{P}{Q}=\frac{l}{100-l}$

$\Longrightarrow \frac{2}{3}=\frac{l}{100-l}$

$\Longrightarrow l=40$ cm

11 **(c)**

$v_d=\frac{I}{nAe}=\frac{20}{10^{29}\times 10^{-6}\times 1.6\times 10^{-19}}=1.25\times 10^{-3}\text{m/s}$

12 **(b)**

Total resistance

Or $R= 20+40$

$R=60\Omega$

Given G=15V

Current $I=\frac{V}{R}=\frac{15}{60}$

$I=0.25A$

Potential gradient $=\frac{V}{l}$

$=\frac{20\times 0.25}{10}=0.5\text{Vm}^{-1}$

PD across 240 cm

$E= 0.5\times 2.4$

$E= 1.2V$

13 **(a)**

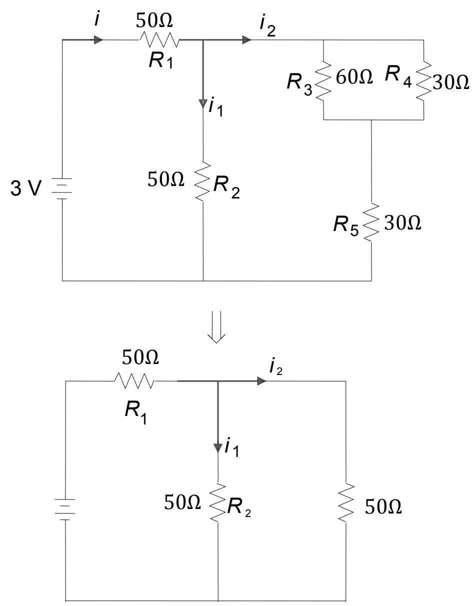
Equivalent resistance of the given network

$R_{\text{eq}}=75\Omega$

∴ Total current through battery,

$i=\frac{3}{75}$

$i_1=i_2=\frac{3}{75\times 2}=\frac{3}{150}$



Current through resistance

$$R_4 = \frac{3}{150} \times \frac{60}{(30+60)}$$
$$= \frac{3}{150} \times \frac{60}{90}$$
$$= \frac{2}{150} A$$
$$V_4 = i_4 \times R_4$$
$$= \frac{2}{150} \times 30$$
$$= \frac{2}{5} = 0.4 \text{ volt}$$

14 **(c)**

Current through a conductor is constant at even cross-section of the conductor

15 **(c)**

Mass deposited $=$ density $\times$ volume of the metal

$m = p \times A \times X$ ...(i)

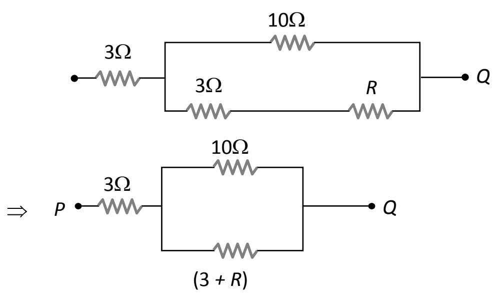
Hence from Faraday's first law $m = Zit$ ...(ii)

So from equation (i) and (ii)

$$Zit = \rho \times Ax \Rightarrow x = \frac{Zit}{\rho A}$$
$$= \frac{3.04 \times 10^{-4} \times 10^{-3} \times 1 \times 3600}{9000 \times 0.05} = 2.4 \times 10^{-6} m = 2.4 \mu m$$

17 **(c)**

The given circuit can be simplified as follows



$R = 3 + \dfrac{10 \times (3 + R)}{10 + 3 + R} = 3 + \dfrac{30 + 10R}{13 + R}$

$R = \dfrac{39 + 3R + 30 + 10R}{13 + R} = \dfrac{69 + 13R}{13 + R}$

$13R + R^2 = 69 + 13R \Rightarrow R = \sqrt{69}\Omega$

18 **(b)**

$R \propto l^2 \Rightarrow$ If l doubled then R becomes 4 times

19 **(c)**

Ammeter is used to measure the current through the circuit

20 **(b)**

$i = \dfrac{E}{r + R} \Rightarrow P = i^2 R \Rightarrow P = \dfrac{E^2 R}{(r + R)^2}$

Power is maximum when $r = R \Rightarrow P_{\max} = E^2/4r$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	A	A	B	A	D	B	A	C	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	B	A	C	C	C	C	B	C	B