DPP
DAILY PRACTICE PRACTICE PROBLEMS

CLASS : XIIth
DATE :

Solutions

SUBJECT : PHYSICS
DPP NO. : 9

Topic :- Current Electricity

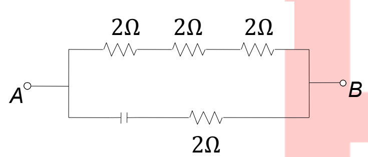
1 **(c)**

$\theta_0 = 2\theta_n - \theta_i = 2 \times 210 - (600 - 273)$

$= 420 - 327 = 93°C$

2 **(c)**

Let the circuit be as shown



Equivalent resistance between A and B is

$$\frac{1}{R} = \frac{1}{2} + \frac{1}{(2+2+2)} = \frac{2}{3}$$

$$R = \frac{3}{2} = 1.5\Omega$$

Therefore, 4 resistances are required.

3 **(b)**

$$\frac{r_{\text{iron}}}{r_{\text{Copper}}} = \sqrt{\frac{\rho_{\text{iron}}}{\rho_{\text{copper}}}} = \sqrt{\frac{1 \times 10^{-7}}{1.7 \times 10^{-8}}} = 2.4$$

4 **(c)**

For a fuse $I^2 \propto r^3$

$$\therefore \frac{I_1^2}{I_2^2} = \frac{r_1^3}{r_2^3}$$

$$\frac{3^2}{I_2^2} = \left(\frac{0.02}{0.03}\right)^3$$

$$I_2 = 3 \times \left(\frac{3}{2}\right)^{3/2} \text{A}$$

5 **(d)**

Let n cells be in series and m in parallel, then

$$\frac{nE}{R+nr}=\frac{E}{R+\frac{r}{m}}$$

$$\Rightarrow\ n\left[R+\frac{r}{m}\right]=R+nr$$

$$\Rightarrow nRm+nr=Rm+mnr$$

$$\Rightarrow 6+2r=3+4r$$

$$\Rightarrow 2r=3$$

$$\Rightarrow\ r=1.5\Omega$$

6 **(a)**

The ratio $\frac{AC}{CB}$ will remain unchanged.

7 **(b)**

$V_2 - V_1 = E - ir = 5 - 2\times 0.5 = 4volt$

$\Rightarrow V_2 = 4 + V_1 = 4 + 10 = 14\ volt$

8 **(a)**

Power in electric bulb

$$P=\frac{V^2}{R}$$

So, resistance of electric bulb

$$R=\frac{V^2}{P}$$

Given, $P_1 = 25$ W, $P_2 = 100$ W,

$V_1 = V_2 = 220$ volt

Therefore, for same potential difference V

$$R\propto\frac{1}{P}$$

Thus, we observe that for minimum power, resistance will be maximum and *vice - versa*.

Hence, resistance of 25 W bulb is maximum and 100 W bulb is minimum.

9 **(c)**

Let temperature of cold junction be 0°C and that of hot junction be T°C. The relation for thermo-emf is given by

$E = AT - \frac{1}{2} BT^2$

Given, $A = 16, B = 0.08$

$\therefore E = 16T - \frac{1}{2} \times 0.08 \times T^2$

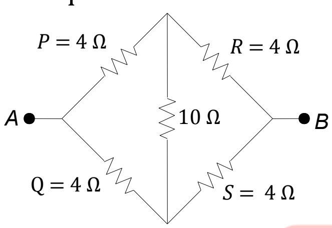
Since, at temperature of inversion emf is zero, we have

$0 = 16T - 0.04\, T^2$

$\Rightarrow T = \frac{16}{0.04} = 400°\text{C}$

10 **(c)**

The equivalent circuit can be redrawn as



we have, $\frac{P}{Q} = \frac{R}{S}$

ie, $\frac{4}{4} = \frac{4}{4}$

So, the given circuit is a balanced Wheatstone's bridge.

Hence, the equivalent resistance

$$R_{AB} = \frac{(4+4) \times (4+4)}{(4+4) + (4+4)}$$

$$= \frac{8 \times 8}{8+8} = \frac{64}{16} = 4\Omega$$

11 **(b)**

Force $=$ Electric intensity $\times$ charge

$$= \frac{\text{Potential diffsrence}}{\text{distance}} \times \text{charge}$$

$$\therefore\ 4.8 \times 10^{-19} = \frac{V}{5} \times 1.6 \times 10^{-19}$$

or $V = 15$ volt

12 **(d)**

In stretching of wire $R \propto \frac{1}{d^4}$, where $d =$ Diameter of wire

13 **(d)**

Total current through the circuit

$$i=\frac{10}{\frac{1000}{3}+500}=\frac{3}{250}A$$

Now voltmeter reading $=i_v\times R_V=\frac{2}{3}\times\frac{3}{250}\times 500=4V$

14 **(b)**

$$E=xl=\frac{V}{l}=\frac{iR}{L}\times l \Rightarrow E=\frac{r}{(R+R_h+r)}\times\frac{R}{L}\times l$$

$$\Rightarrow E=\frac{10}{(5+4+1)}\times\frac{5}{5}\times 3=3V$$

15 **(c)**

$i=nAev_d$

or $v_d=\frac{i}{nAe}ie,\ v_d\propto\frac{1}{A}$

As A increases v_d decreases, because i remains constant

16 **(a)**

$R=\rho l/A$ or $R\propto l/A$. Thus, resistance is least in a wire of length $L/2$ and area of cross-section $2A$

17 **(c)**

$$V_d=\frac{i}{nAe}=\frac{5.4}{8.4\times 10^{28}\times 10^{-6}\times 1.6\times 10^{-19}}$$

$=0.4\times 10^{-3}\ m/sec=0.4\ mm/sec$

18 **(c)**

The power of the battery, when charged, is given by

$P_1=V_1I_1$

The electrical energy dissipated is given by $E_1=P_1t_1$

i.e., $E_1=V_1I_1t_1=15\times 10\times 8=1200\ W\text{h}$

Similarly, the electrical energy dissipated during the discharge a battery is given by,

$E_2=V_2I_2t_2=14\times 5\times 15=1050\ W\text{h}$

Hence, watt-hour efficiency of the battery is given by

$$\eta=\frac{E_2}{E_1}\times 100=0.875\times 100=87.5\%$$

19 **(d)**

Total power spend across two resistors connected

in parallel to battery $=\frac{V^2}{R_1}+\frac{V^2}{R_2}$

$$=\frac{3\times 3}{2}+\frac{3\times 3}{2/3}=\frac{36}{2}=18$$

$=3\times 3\times 2\ \text{J}$

20 **(b)**

Conductance $C = \frac{1}{R} = \frac{A}{\rho l} \Rightarrow C \propto \frac{1}{l}$

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