DPP

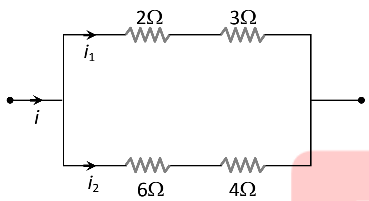
DAILY PRACTICE PROBLEMS

CLASS : XIIth **Solutions** **SUBJECT : PHYSICS**

DATE : **DPP NO. : 10**

Topic :- Current Electricity

1 **(d)**



Resistance of upper branch $R_1 = 2 + 3 = 5\Omega$

Resistance of lower branch $R_2 = 4 + 6 = 10\Omega$

Hence $\frac{i_1}{i_2} = \frac{R_2}{R_1} = \frac{10}{5} = 2$

$$\frac{\text{Heat generated across } 3\ \Omega\ (\mathrm{H}_1)}{\text{Heat generated across } 6\ \Omega\ (\mathrm{H}_2)} = \frac{i_1^2 \times 3}{i_2^2 \times 6} = \frac{4}{2} = 2$$

$\therefore$ Heat generated across $3\ \Omega = 120\ cal/sec$

2 **(b)**

At resonance both bulbs will glow with same brightness. At resonance,

$X_L = X_C$

Or $2\pi f L = \frac{1}{2\pi f C}$

Or $f = \frac{1}{2\pi\sqrt{LC}}$

3 **(d)**

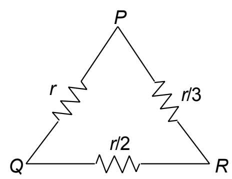
$$R \propto \frac{1}{r^2} \Rightarrow \frac{R_1}{R_2} = \frac{l_1}{l_2} \times \frac{r_2^2}{r_1^2} \Rightarrow \frac{1}{1} = \frac{5}{l_2} \times \left(\frac{2}{1}\right)^2 \Rightarrow l_2 = 20m$$

4 **(c)**

If an identical battery is connected in opposition, net emf $= E - E = 0$ and the current through circuit will be zero, although each one of them has constant emf.

5 **(a)**

The circuit given in figure can be redrawn as shown here. Here two resistances are joined in series and the combination is joined in parallel with the third resistance. Since in parallel grouping effective resistance is even less than the smallest individual resistance, hence net resistance will be maximum between the points P and Q



6 **(c)**

$i_g = \frac{iS}{S+G} \Rightarrow 10 = \frac{50 \times 12}{12+G} \Rightarrow 12 + G = 60 \Rightarrow G = 48\Omega$

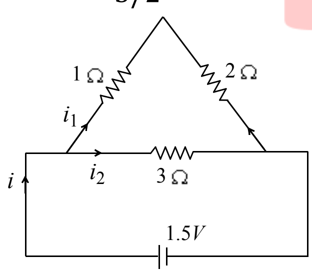
7 **(b)**

$i_g S = (i - i_g)G \Rightarrow i_g(S+G) = iG$

$\Rightarrow \frac{i_g}{i} = \frac{G}{S+G} = \frac{8}{2+8} = 0.8$

8 **(b)**

$i_1 + i_2 = \frac{1.5}{3/2} = 1\ amp$



$\frac{i_1}{i_2} = \frac{3}{3} \Rightarrow i_1 = i_2\ \therefore i_2 = 0.5A = i_1$

9 **(d)**

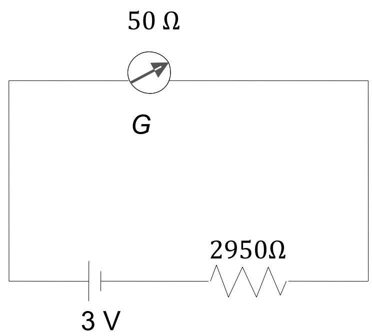
Current through the galvanometer

$I = \frac{3}{(50+2950)} = 10^{-3}A$

Current for 30 divisions $= 10^{-3}A$

Current for 20 divisions

$= \frac{10^{-3}}{30} \times 20 = \frac{2}{3} \times 10^{-3}A$



For the same deflection to obtain for 20 divisions, let resistance added be R

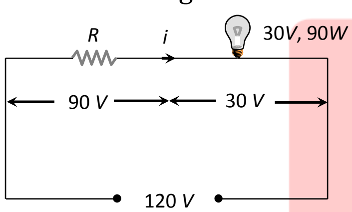
$\therefore\ \frac{2}{3} \times 10^{-3} = \frac{3}{(50 + 1R)}$

or $R = 4450\Omega$

10 **(c)**

Suppose resistance R is corrected in series with bulb

Current through the bulb $i = \frac{90}{30} = 3\ A$



Hence for resistance $V = iR \Rightarrow 90 = 3 \times R \Rightarrow R = 30\Omega$

11 **(c)**

$R_{\max} = nR$ and $R_{\min} = R/n \Rightarrow \frac{R_{\max}}{R_{\min}} = n^2$

12 **(a)**

The voltage per unit light of the metre wire PQ is $\left(\frac{6.00\ mV}{0.600\ m}\right)$ $i.e.$ $10\ mV/m$. Hence potential difference across the metre wire is $10mV/m \times 1m = 10\ mV$. The current drawn from the driver cell is $i = \frac{10\ mV}{5\ \Omega} = 2\ mA$

The resistance $R = \frac{(2V - 10mV)}{2\ mA} = \frac{1990\ mV}{2\ mA} = 995\ \Omega$

13 **(b)**

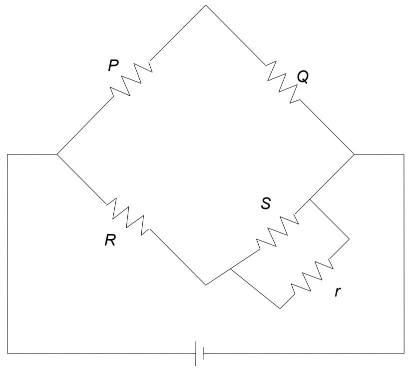
To make range n times, the galvanometer resistance should be G/n, where G is initial resistance

14 **(d)**

Let a resistance r ohm be shunted with resistance S, so that the bridge is balanced.

If S' is the resultant resistance of S and r, then

In balanced position



$$\frac{P}{Q}=\frac{R}{S'}$$
$$\frac{2}{2}=\frac{2}{S'}$$
$\therefore\ S'=2\Omega$

Now,
$$\frac{1}{S'}=\frac{1}{S}+\frac{1}{r}$$
or $\frac{1}{r}=\frac{1}{S'}-\frac{1}{S}=\frac{1}{2}-\frac{1}{3}=\frac{3-2}{6}$
$$\frac{1}{r}=\frac{1}{6}$$
$r=6\Omega$

15 **(d)**

Let the value of shunt be r. Hence the equivalent resistance of branch containing S will be $\frac{Sr}{S+r}$

In balance condition, $\frac{P}{Q}=\frac{Sr/(S+r)}{R}$. This gives $r=8\Omega$

17 **(b)**

$P=Vi \Rightarrow i=\frac{2.2\times10^3}{22000}=\frac{1}{10}A$

Now loss of power $=i^2R=\left(\frac{1}{10}\right)^2\times100=1\ W$

18 **(b)**

Let resistance for bulb filament at o°C be R_0 and at a temperature θ°C its value be 200 Ω.

Then, $100=R_0(1+\alpha\times100)=R_0(1+0.005\times100)$

$=R_0(1.5)$ ...(i)

and $200=R_0(1+\alpha\times\theta)=R_0(1+0.005\times\theta)$

$=R_0(1.005\theta)$ ...(ii)

Dividing Eq. (ii) by Eq.(i), we get $2 = \frac{1 + 0.005\theta}{1.5}$

$3 = 1 + 0.005\theta$

$\Rightarrow \theta = \dfrac{2}{0.005} = 400°C$

19 **(c)**

Since the current coming out from the positive terminal is equal to the current entering the negative terminal, therefore, current in the respective loop will remain confined in the loop itself

$\therefore$ Current through 2Ω resistor $= 0$

20 **(d)**

Graph (d) represents the thermal energy produced in a resistor.

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