Self corrected

15/20

Revision 1. - Electricity

1. Case 1.

$P = 50W$

$V = 220V$

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

$\therefore 50 = \frac{220 \times 220}{R}$

$R = \frac{220 \times 220}{50} \Rightarrow \frac{4840\cancel{0}}{5\cancel{0}}$

$\therefore R_1 = 9688\ \Omega$

Case 2.

$P = 25W$

$V = 220V$

$\therefore P = \frac{V^2}{R} \Rightarrow 25 = \frac{220 \times 220}{R}$

$R = \frac{48400}{25} \Rightarrow \frac{96880}{5}$

$\therefore R_2 = 193376\ \Omega$

as $R_2 > R_1$

$R_2 - R_1 = 193376 - 9688$

$= 183688\ \Omega$

∴ ~~the~~ The bulb with 25W, 220V has higher resitance and by 183688 Ω than the bulb of 50W, 220V

X

2. $R_1 = \rho \frac{l_1}{A_1}$

$R_2 = \rho \frac{l_2}{A_2}$

ratio $= \frac{\rho \cancel{l}/A}{\rho \cancel{l}/A}$

$= \frac{1}{1} \Rightarrow 1:1$

X

22
22
44
44×
484

× 968
5) 4840
45
34
30
44
40

× 9680
5) 48400
45
34
30
44
40
40

× 193376
5) 966880
5
46
45
16
15
18
15
38
35
30

193376
9688

193376
- 9688
183688

3. (i) (c) a milliammeter, a resistor and a voltmeter ✓

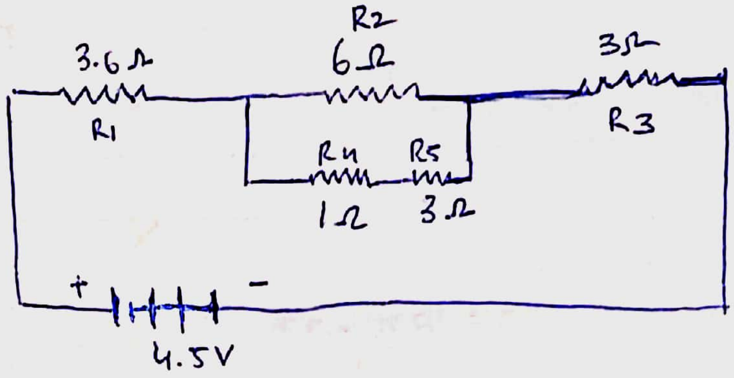
(ii) (a) I = 4, V = 4 ✓

4M

(iii) (a) 2Ω ✓

(v) (a) 1 ✓

4.



R4 and R5 are in series and both are parallel to R2.

$\rightarrow R_3 = R_4 + R_5$

$= 1 + 3$

$= 4\Omega$

$1/R_p = \frac{1}{4} + \frac{1}{6} \Rightarrow \cancel{2}\ \frac{4+6}{24} \Rightarrow \frac{10}{24}$

$R_p = \frac{24}{10} = 2.4\Omega$

This effective R is in series with R1 and R3

$\therefore R_S = 3.6 + \cancel{3}\ 2.4 + 3$

$= 9.0\Omega$

$$\begin{array}{r} 3.6 \\ 2.4 \\ 3.0 \\ \hline 9.0 \end{array}$$

& $V = 4.5V$

$R = 9\Omega$

$I = \frac{V}{R}$

$= \frac{4.5}{9} \frac{\times 10}{\times 10}$

$= \frac{45}{90} \Rightarrow \frac{1}{2}$

$\Rightarrow \therefore I = 0.5A$

∴ the current passing is 0.5A ✓ 3M

5. (a) R4 and R5 are in series connection. ✗

(b) R3 and R2 are in parallel connection. ✓

(c) R1 will not contribute to the effective resistance. It is joined back to itself, therefore the resistance cancels out.

$1/R_p = \frac{1}{R_3} + \frac{1}{R_2}$

$= \frac{1}{2} + \frac{1}{2} \Rightarrow 1$ 2M

$\therefore R_p = 1 \Omega$

$R_s = R_4 + R_5 + 1$

$= 2 + 2 + 1$

$= 5 \Omega$

$V = 5V$

$\therefore I = \frac{V}{R} \Rightarrow \frac{5}{5}$

$\therefore I = 1A$

6. $P = 24W$

$V = 12 V$

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

$R = \frac{V^2}{R} \Rightarrow \frac{\overset{1}{\cancel{12}} \times 12}{\cancel{24}\, 2} \Rightarrow 6 \Omega$

$\therefore R = 6\,\Omega$

$V = 6\,V$

$P = \frac{V^2}{R} \Rightarrow \frac{6 \times \cancel{6}}{\cancel{6}} \Rightarrow \underline{\underline{6\,W}}$. ✓ 3M

7.

7. (a) We can place the switch in series with lamp L2 another switch, in series, with lamp ~~4~~ L3. Since, this is a parallel connection, if we swith on/off L2 and L3, it will not affect L1. ½

(b) The name is a parallel connection. ✓ ①

(c) $V = 6V + 6V$

$= 12V$ ✓½

$A_1 \rightarrow I = 1.5A$

$\therefore$ total R of circuit $= \frac{V}{I}$ ($\because V = IR$)(Ohm's law)

$\Rightarrow \frac{12}{1.5} \Rightarrow \frac{4 \times 10}{0.5 \times 10}$

$\Rightarrow \frac{40}{5} \Rightarrow \underline{\underline{8\,\Omega}}.$ ✗

A_2 reading $\Rightarrow V = 12V$

$R = 8\,\Omega$

$I = \frac{V}{R}$

$= \frac{12}{8} \Rightarrow \frac{6}{4} \Rightarrow \frac{2}{3}$

$\therefore I = 0.666\,A$

$= \underline{\underline{0.67A}}.$ ✗

$$\begin{array}{r} 1.5 \\ \times 8 \\ \hline 12.0 \end{array}$$

(d) $R = 8\,\Omega$

$I = 1.5A$

$V = IR$

$= 8 \times 1.5$ ✓①

$= \underline{\underline{12V}}$

3/5M