4) R ——————
R ——————

If Connected in Series = $R + R = 2R$

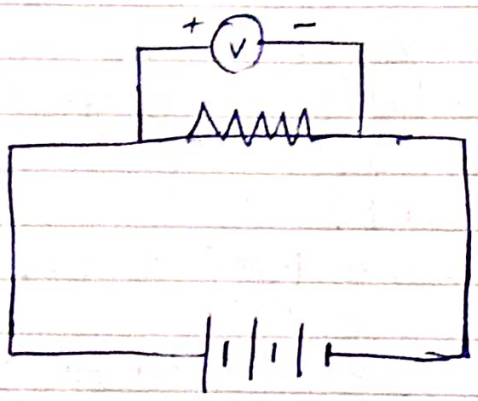
If Connected in Parallel = $\frac{1}{R} + \frac{1}{R} = \frac{2}{R}$

$$\frac{1}{R_p} = \frac{2}{R}$$

$$R_p = \frac{R}{2}$$

$$\frac{H_s}{H_p} = \frac{\frac{V^2}{R_s} \times T}{\frac{V_2}{R_p} \times T} = \frac{R_p}{R_s} = \frac{R}{2 \times 2R} = \frac{1}{4}.$$

5)



[Draw figure with Pencil].

To Measure the Potential Difference between two Points, a Voltmetre should be Connected in Parallel to the Points.

9) $R = 0.2 + 0.3 + 0.4 + 0.5 + 12 = 13.4\,\Omega$

$V = 9\,V$

$V = IR$

$I = \frac{V}{R} = \frac{9}{13.4} = 0.671\,A$

10). $V = IR$

$$R = \frac{V}{I} = \frac{220}{5} = 44\,\Omega.$$

Total Resistance of wire is $44\,\Omega$

Let there be x No of $176\,\Omega$ resistor

$$\frac{1}{R_p} = \frac{1}{176.} \times x.$$

$$R_p = \frac{176}{x.}$$

$$44 = \frac{176}{x.}$$

$$x = \frac{176}{44} = 4$$

11).

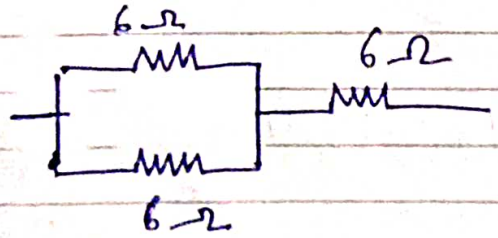
If the Resistance is connected in series, then the equivalent Resistance will be the sum of three resistance $= 6+6+6 = 18\,\Omega$ which is Not Desired.

If we connect in Parallel

$$\frac{6}{2} = 3\,\Omega.$$ which is Not desired

Hence we should connect two ~~Resistance~~ resistors in series or Parallel

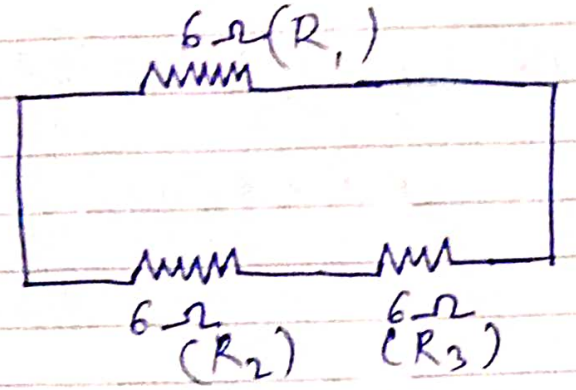
i) Two Resistor in Parallel



$$\frac{1}{R_p} = \frac{1}{\frac{1}{6}+\frac{1}{6}} = \frac{1}{\frac{1+1}{6}} = \frac{1 \times 6}{2} = 3\,\Omega$$

The Third 6Ω resistor is in series with 3Ω
Hence Equivalent Resistance in the Circuit
$6\Omega + 3\Omega = 9\Omega$

11) Two Resistors in Series



$R_2 + R_3 = 6\Omega + 6\Omega = 12\Omega$ [Connected in series]

$R_2 + R_3 = R'$

R_1 & R' are in Parallel [12Ω & 6Ω]

$$\frac{1}{\frac{1}{12}+\frac{1}{6}} = \frac{1}{\frac{1+2}{12}} = 1 \times \frac{12}{3} = 4\Omega$$

12). Resistance R_1 of the bulb is Given by Expression

$$P_1 = \frac{(V)^2}{R_1} \qquad R_1 = \frac{V^2}{P_1}$$

$V = 220V$
$I = 5A$
$P_1 = 10W$

$$R_1 = \frac{(220)^2}{10} = \frac{48400}{10} = 4840\Omega$$

According to ohm's Law

$$V = IR$$

R is the total Resistance of the Circuit for x number of Electric bulbs

$$R = \frac{V}{I} = \frac{220}{5} = 44\ \Omega$$

Resistance of each Electric Bulb (R_1) = $4840\ \Omega$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_1} + \dots \text{ up to x times}$$

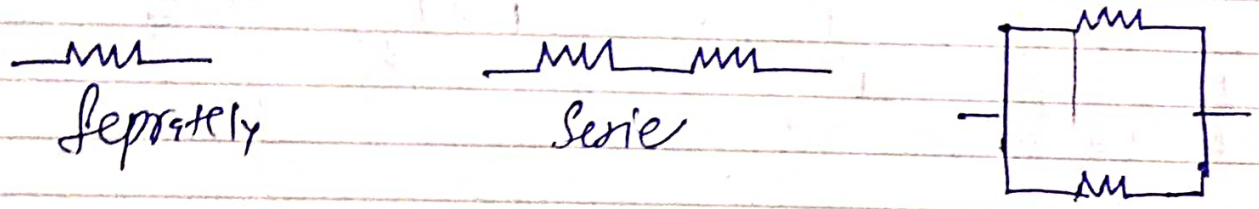
$$\frac{1}{R} = \frac{1}{R_1} \times x$$

$$x = \frac{R_1}{R} = \frac{4840}{44} = 110$$

Therefore, 110 Electric bulbs are Connected in Parallel.

(3) $V = 220\ V$ $\quad R_A = 24\ \Omega$

$I = ?$ $\quad R_B = 24\ \Omega$



Case I When Connected Seprately.

$$I_1 = \frac{V}{R_1} = \frac{220}{24} = 9.167A$$

Case II When Connected in Series

$$I_2 = \frac{V}{R_A + R_B} = \frac{220}{48} = 4.5835A$$

Case III When Connected in Parallel.

$$I_3 = \frac{V}{R_A + R_B} = \frac{220}{12} = 18.33A$$