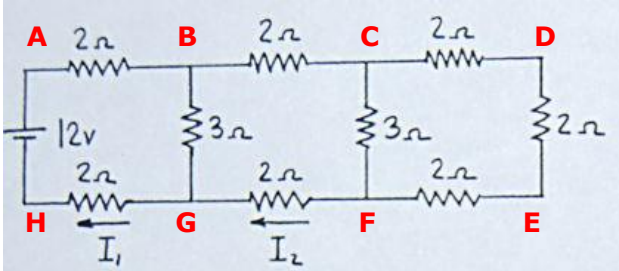
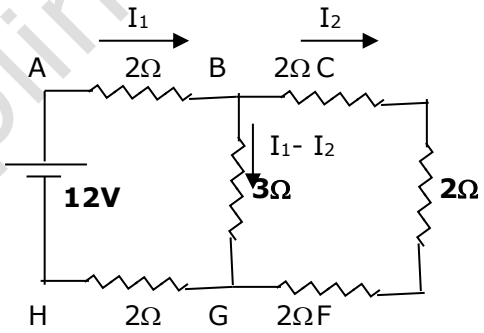
QQ- In the circuit bellow
(a) Find the equivalent resistance of the circuit.
(b) Find the currents I_1 and I_2.



(a) The three resistances between CD, DE and EF are in series (the same current through them) and their equivalent resultant will be 2 + 2 + 2 = 6 Ω.

This combination is in parallel with resistance 3 Ω between CF and thus the resultant resistance between C and F will be given by

$$R_{CF} = \frac{3*6}{3+6} = 2\ \Omega$$



Thus, the circuit will reduce to the circuit given in the figure Now again in the same way the three resistances between BC, CF and FG are in series and their equivalent resultant will be 2 + 2 + 2 = 6 Ω.

This combination is in parallel with resistance 3 Ω between BG and thus the resultant resistance between B and G will be given by

$$R_{BG} = \frac{3*6}{3+6} = 2\ \Omega$$

Thus, the circuit will reduce to the three resistances of 2Ω each in series with the cell and the equivalent resistance is given by

R_{eq} = 2 + 2 + 2 = 6 Ω

b) Here I_1 is the total current through the circuit and as the emf of the cell is 12 V and the equivalent resistance of the circuit is 6 Ohm the current is given by Ohm's law as

$I_1 = V/R_{eq} = 12/6 = 2$ A

Now as the current I_1 is distributed to two branches at B or resistances 6 Ω and 3 Ω, if the potential difference between B and G is V' then using Ohms law again we get

$V' = I_2*6 = (I_1 - I_2)*3$

Gives $I_2*6 = 3\ I_1 - 3\ I_2$

Or $9\ I_2 = 3\ I_1$

Or $I_2 = I_1/3 = 2/3 = 0.667$ A