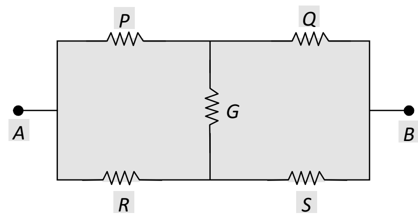
Some Standard Results for Equivalent Resistance.

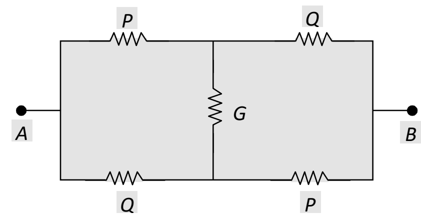
(1) Equivalent resistance between points A and B in an unbalanced Wheatstone's bridge as shown in the diagram.

(i)



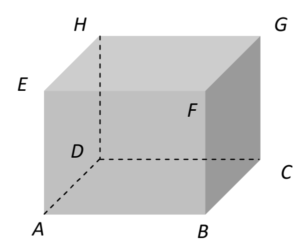
$$R_{AB} = \frac{PQ(R+S)+(P+Q)RS+G(P+Q)(R+S)}{G(P+Q+R+S)+(P+R)(Q+S)}$$

(ii)



$$R_{AB} = \frac{2PQ+G(P+Q)}{2G+P+Q}$$

(2) A cube each side have resistance R then equivalent resistance in different situations



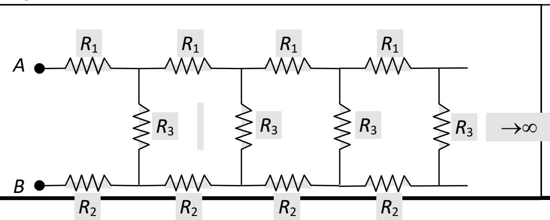
(i) Between E and C i.e. across the diagonal of the cube $R_{EC} = \frac{5}{6}R$

(ii) Between A and B i.e. across one side of the cube $R_{AB} = \frac{7}{12}R$

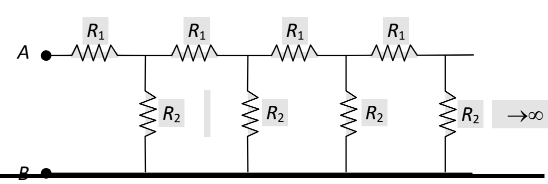
(iii) Between A and C i.e. across the diagonal of one face of the cube $R_{AC} = \frac{3}{4}R$

(3) The equivalent resistance of infinite network of resistances

(i)



(ii)



$R_{AB} = \frac{1}{2}(R_1 + R_2) + \frac{1}{2}\left[(R_1 + R_2)^2 + 4R_3(R_1 + R_2)\right]^{1/2}$	$R_{AB} = \frac{1}{2}R_1\left[1 + \sqrt{1 + 4\left(\frac{R_2}{R_1}\right)}\right]$

Concepts

If n identical resistances are first connected in series and then in parallel, the ratio of the equivalent resistance is given by $\frac{R_p}{R_s} = \frac{n^2}{1}$.

If equivalent resistance of R1 and R2 in series and parallel be Rs and Rp respectively then $R_1 = \frac{1}{2}\left[R_s + \sqrt{R_s^2 - 4R_sR_p}\right]$ and $R_2 = \frac{1}{2}\left[R_s - \sqrt{R_s^2 - 4R_sR_p}\right]$.

If a wire of resistance R, cut in n equal parts and then these parts are collected to form a bundle then equivalent resistance of combination will be $\frac{R}{n^2}$.