## Zero Potential Due to a System of Two Point Charge.

If both charges are like then resultant potential is not zero at any finite point because potentials due to like charges will have same sign and can therefore never add up to zero. Such a point can be therefore obtained only at infinity.
If the charges are unequal and unlike then all such points where resultant potential is zero lies on a closed curve, but we are interested only in those points where potential is zero along the line joining the two charges.
Two such points exist, one lies inside and one lies outside the charges on the line joining the charges. Both the above points lie nearer the smaller charge, as potential created by the charge larger in magnitude will become equal to the potential created by smaller charge at the desired point at larger distance from it.

## I. For internal point :


(It is assumed that $\left|Q_{1}\right|<\left|Q_{2}\right|$ ).

$$
\frac{Q_{1}}{x_{1}}=\frac{Q_{2}}{\left(x-x_{1}\right)} \Rightarrow \boldsymbol{x}_{\mathbf{1}}=\frac{\boldsymbol{x}}{\left(\boldsymbol{Q}_{2} / Q_{\mathbf{1}}+\mathbf{1}\right)}
$$

## II. For External point :



$$
\frac{Q_{1}}{x_{1}}=\frac{Q_{2}}{\left(x+x_{1}\right)} \Rightarrow \boldsymbol{x}_{\mathbf{1}}=\frac{\boldsymbol{x}}{\left(\boldsymbol{Q}_{2} / Q_{1}-\mathbf{1}\right)}
$$

