Work Done in Displacing a Charge.

(1) **Definition :** If a charge Q displaced from one point to another point in electric field then work done in this process is $W = Q \times \Delta V$ where ΔV = Potential difference between the two position of charge Q. ($\Delta V = \vec{E} \cdot \Delta \vec{r} = E \Delta r \cos \theta$ where θ is the angle between direction of electric field and direction of motion of charge).

(2) Work done in terms of rectangular component of \vec{E} and \vec{r} : If charge Q is given a displacement $\vec{r} = (r_1\hat{i} + r_2\hat{j} + r_3\hat{k})$ in an electric field $\vec{E} = (E_1\hat{i} + E_2\hat{j} + E_3\hat{k})$. The work done is $W = Q(\vec{E} \cdot \vec{r}) = Q(E_1r_1 + E_2r_2 + E_3r_3)$.