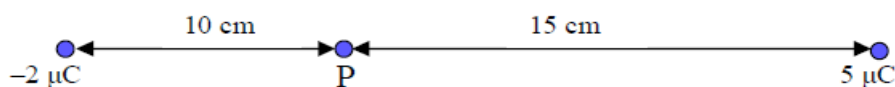


State Examination Commission – Physics Higher Level, 2010

Question 12d

Define electric field strength and give its unit of measurement. (9)

The diagram shows a negative charge of $2 \mu\text{C}$, positioned 25 cm away from a positive charge of $5 \mu\text{C}$.



Copy the diagram into your answer book and show on it the direction of the electric field at point P.

Calculate the electric field strength at P. (15)

Under what circumstances will point discharge occur? (4)

(permittivity of free space = $8.9 \times 10^{-12} \text{ F m}^{-1}$)

Define electric field strength and give its unit of measurement. (9)

Electric field strength is the force per unit positive charge at a point in an electric field. Units, Vm^{-1} or NC^{-1}

The diagram shows a negative charge of $2 \mu\text{C}$, positioned 25 cm away from a positive charge of $5 \mu\text{C}$.

Copy the diagram into your answer book and show on it the direction of the electric field at point P.



Calculate the electric field strength at P. (15)

$$E = \frac{1}{4\pi\epsilon_0} \frac{2 \times 10^{-6}}{0.1^2} + \frac{1}{4\pi\epsilon_0} \frac{5 \times 10^{-6}}{0.15^2}$$

$$E = \frac{1}{4\pi\epsilon_0} \left(\frac{2 \times 10^{-6}}{0.1^2} + \frac{5 \times 10^{-6}}{0.15^2} \right)$$

$$E = 3.78 \times 10^6 \text{ Vm}^{-1}$$

in the direction indicated in diagram

Under what circumstances will point discharge occur? (4)

When charge accumulates at a point to produce a large potential at the point