THE HIGH RANKERS

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Physics XII

class-12th chapter: Electrostatic Potential & Capacitance

paper 02

Time : 1:30hr ***M.marks : 25***

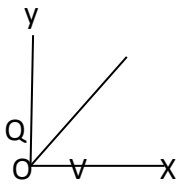
General instructions

1. ***Question Paper contains four sections.***
   Section A contains 1 questions of 1 mark
   Section B contains 4 questions of 2 marks
   Section C contains 2 questions of 3 marks
   Section D contains 2 questions on 5 marks
2. ***All questions are compulsory.***

Section A

Q.1 Sketch a graph to show how charge q given to a capacitor of capacity c varies with the potential difference v.

Ans.



Section B

Q.2 Given a battery how would you connect two capacitors in series or in parallel for them to store the greater (a) Total charge (b) Total energy.

Ans. (a) Total charge q = cv

(b) Total energy U = $\frac{1}{2}v^2$

CP >CS

Q.3 Define the term surface charge density and its S.I unit ? with formula.

Ans. The electric charge per unit area .and its S.I unit is c/m^2

Formula = $\sigma = \frac{q}{A}$

Q.4 Equipotential surface are perpendicular to field line? Why.

Ans. No work done from one point to another .

Therefore complete the electric field intensity along the equipotential surface is zero.

Q.5 Suggest an arrangement of three point charges separated by finite distances that has zero electric potential energy.

Ans. U = $\frac{kq(q)}{r} + \frac{kq(-q)}{2r} + \frac{k(-q)q}{2r}$

= zero

Section C

Q.6 An infinite line charge produces a field of 9×10power4 N/C at a distance of 2cm. Calculate the liner charge density.

Ans. E = 9 10^4 N/C

E = $\frac{\lambda}{2\pi\varepsilon r}$

λ = 10-7

Section D

Q.7 What is the field in the cavity if a conductor having a cavity is charged. Does the result depend on the shape and size of cavity or conductor?

Ans. $\emptyset = \varphi E.ds$

$= \frac{q}{\varepsilon} = 0$

E = 0

i.e electric field vanishes in a conductor or in a cavity. This is a independent of shape and size of conductor and cavity.

Q.8 Explain van de Graff generator? Write its principal, Construction and working.

Ans. This device is used for building up high potential difference for a few million volt.

Principal- (1) The action of shape point i.e the phenomenon of corona discharge.

(2) Charge distribute to whole outer surface.

Construction-

Working- The earth by high tension source H.T. Due to discharging action of sharp point, a positively charged electric wind is set up, which sprays positive charge on the belt.

C = $4\pi\varepsilon R$

V = $\frac{Q}{C}$

V = $\frac{Q}{4\pi\varepsilon r}$

Q.9 Calculate the capacity of earth, taking it as a sphere of radius 6400km.and what is the area of the plates of a farad parallel plate capacitor, given that the separation between the plate is 0.5cm?

Ans. (1) C = $4\pi\varepsilon R$

= 7.11× 10^{-4}Farad

(2) c = $\frac{\varepsilon A}{d}$

A = 1.13× 10^{9} m^2