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Note:-

1. All Questions are compulsory.
2. Numbers on the right indicate full marks.

Section A

Q.1 Select and Write the correct answer.

(4)

1. A large insulated sphere of radius r charged with Q units of electricity is placed in contact with a small insulated uncharged sphere of radius r and is then separated. The charge on smaller sphere will now be.
A) $\frac{1}{4\pi\epsilon_0} \frac{Qq}{l}$ B) $\frac{1}{4\pi\epsilon_0} \frac{Qq}{l^2}$
C) $\frac{1}{4\pi\epsilon_0} Qql$ D) zero
2. When a body is charged by induction, then the body.
A) becomes neutral B) does not loose any charge
C) looses whole of the charge on it D) looses part of the charge on it
3. A plane surface element of area 1 mm^2 is situated in a uniform electric field of intensity $18 \times 10^6 \text{ N/C}$ with its plane making an angle of 30° with the direction of the field. What is electric flux through the surface elements?
A) $9 \text{ Nm}^2/\text{C}$ B) $70 \text{ Nm}^2/\text{C}$
C) 9 Vm D) Both (a) and (c)
4. A metal surface of area 1 m^2 is charged with $\sqrt{8.85} \mu\text{C}$ in air. The force acting on it will be
A) 0.1 N B) 1 N
C) 0.5 N D) 5 N

Q.2 Answer the following.

(3)

1. When do we use series combination of capacitors?
2. What is the need to enclose Vande Graaff generator inside an earth-connected enclosure filled with air under pressure.
3. Why should a test charge be of negligibly small magnitude?

Section B

Attempt any Four

- Q.3 How do we give direction of electric field for uniformly charged wire? **(2)**
- Q.4 What do you mean by dielectrics? **(2)**
- Q.5 What is Gauss's law and what is a Gaussian surface? **(2)**
- Q.6 Is electrostatic potential necessarily zero at a point where electric field strength is zero? Justify. **(2)**

- Q.7 An infinite thin plane sheet of charge density 10^{-8}C/m^2 is held in air. How far apart are two equipotential surfaces, whose p.d. is 5 volts. (2)
- Q.8 Two charges of magnitudes $-4Q$ and $+2Q$ are located at points $(2a,0)$ and $(5a,0)$ respectively. What is the electric flux due to this charges through a sphere of radius $4a$ with its centre at the origin? (2)

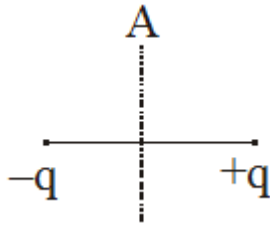
Section C
Attempt any Two

- Q.9 Derive an expression for electrostatic potential due to system of charges. (3)
- Q.10 State uses of van de graff generator. (3)
- Q.11 Three charges $-q$, $+Q$ and $-q$ are placed at equal distance on straight line. If the potential energy of the system of three charges is zero, then what is the ratio of $Q : q$? (3)

Section D
Attempt any One

- Q.12 Draw graph to show relation between potential & intensity with distance. (4)

A charge q is move from a point A above a dipole of dipole moment p to a point B below the dipole in equatorial plane without acceleration. Find the work done in this process.



- Q.13 Derive an expression for capacitance of parallel plate capacitor with dielectric. (4)