CH: 2-(ELECTRIC POTENTIAL AND CAPACITANCE)

1. A positively charged particle is released from rest in a uniform electric field. The electric potential energy of the charge

    (a) remains a constant because the electric field is uniform.
    (b) increases because the charge moves along the electric field.
    (c) decreases because the charge moves along the electric field.
    (d) decreases because the charge moves opposite to the electric field.

2. Equipotentials at a great distance from a collection of charges whose total sum is not zero are approximately

    (a) spheres.
    (b) planes.
    (c) paraboloids
    (d) ellipsoids.

3. If a conductor has a potential $V \neq 0$ and there are no charges anywhere else outside, then

    (a) there must be charges on the surface or inside itself.
    (b) there cannot be any charge in the body of the conductor.
    (c) there must be charges only on the surface.
    (d) there must be charges inside the surface.

4. A capacitor has some dielectric between its plates, and the capacitor is connected to a DC source. The battery is now disconnected and then the dielectric is removed. State whether the capacitance, the energy stored in it, electric field, charge stored and the voltage will increase, decrease or remain constant.

5. Calculate potential on the axis of a ring due to charge Q uniformly distributed along the ring of radius R.

6. Two metal spheres, one of radius R and the other of radius $2R$, both have same surface charge density σ. They are brought in contact and separated. What will be new surface charge densities on them?

7. Two charges $q1$ and $q2$ are placed at $(0, 0, d)$ and $(0, 0, –d)$ respectively. Find locus of points where the potential a zero.

8. Calculate potential on the axis of a disc of radius R due to a charge Q uniformly distributed on its surface.

9. An electric dipole of length 4 cm, when placed with its axis making an angle of $60°$ with a uniform electric field experiences a torque of $4\sqrt{3}$ Nm. Calculate (i) the magnitude of the electric field, (ii) potential energy of the dipole , if the dipole has charges of ± 8 nC.

10. Three point charges, $+ Q, + 2Q$ and $– 3Q$ are placed at the vertices of an equilateral triangle ABC of side l. If these charges are displaced to the midpoints A_1, B_1 and C_1 respectively, find the amount of the work done in shifting the charges to the new locations.