Q.1) (i) A uniform electric field pointing in positive y direction exists in a region. Let A be the origin. B be the point on x-axis at x=2 cm and C be the point on y-axis at y=2 cm. Then the potentials at the points A, B, C satisfy
(a) \( V_A < V_B \) \hspace{1cm} (b) \( V_A > V_B \) \hspace{1cm} (c) \( V_A < V_C \) \hspace{1cm} (d) \( V_A > V_C \)

(ii) If we carry a charge once around an equipotential path, then work done by the charge is
(a) Infinity \hspace{1cm} (b) positive \hspace{1cm} (c) negative \hspace{1cm} (d) zero

(iii) The potential at the centre of the sphere, if hollow metallic sphere of radius 10 cm is charged such that potential of its surface is 70 V is
(a) 100V \hspace{1cm} (b) 35 V \hspace{1cm} (c) 70 V \hspace{1cm} (d) 7 V

(iv) In a certain charge distribution, all points having zero potential can be joined by a circle S. Points inside S have positive potential and points outside S have negative potential. A positive charge, which is free to move, is placed inside S.
(a) It will remain in equilibrium \hspace{1cm} (b) It can move inside S, but it cannot cross S.
(c) It must cross S at some time. \hspace{1cm} (d) It may move, but will ultimately return to its starting point.

Q.2) (i) In a certain 0.1m\(^3\) of space, electric potential is found to be 5 V throughout. What is the electric field in the region?

(ii) It requires 50\(\mu\)J of work to carry a 2 \(\mu\)C charge from a point A to B. What is the potential difference between these points? Which point is at higher potential?

(iii) What is the shape of the equipotential surfaces for a uniform electric field?
SECTION –B

Q.3) Give two properties of equipotential surfaces.

Q.4) The electric field at a point due to a point charge is 20 N/C and the electric potential at that point is 10 J/C. Calculate the distance of the point from the charge and the magnitude of the charge.

Q.5) A short electric dipole has dipole moment of \(1 \times 10^{-9}\) Cm. Determine the electric potential due to a dipole at a point distance 0.3 m from the centre of the dipole situated on a line making an angle of 60\(^0\) with the dipole axis.

Q.6) Graphically show the variation of electric field and electric potential with the distance \((r)\).

SECTION-C

Q.7) Derive an expression for Electric potential due to a point charge.

Q.8) Given: \(q_1 = -5 \times 10^{-6}\) C and \(q_2 = +2 \times 10^{-6}\) C.
   (a) Calculate the electric potential at corner B of the rectangle.
   (b) Calculate the potential at corner A of the rectangle.

SECTION- D

Q.9) Derive an expression for electric potential due to an electric dipole.