CHAPTER -1
ELECTRIC CHARGES AND FIELD

1. Charges of magnitudes 2Q and –Q are located at points (a,0,0) and (4a,0,0). Find the ratio of the flux of electric field due to these charges through concentric sphere as of radii 2a and 8a centered at the origin.
2. An electric dipole free to move is placed in a uniform electric field. Explain along with diagram its motion when it is placed (a) parallel to the field (b) perpendicular to the field.
3. A charge having magnitude Q is divided into two parts q and (Q-q). If the two parts exert a maximum force of repulsion on each other, then find the ratio Q/q.
4. A charged spherical conductor has a surface density of $0.7C/m^2$.When its charge is increased by 0.44C, the charge density changes by $0.14C/m^2$.Find the radius of the sphere and intial charge on it.
5. The electric field in a region can be expressed as $E = [(3/5)i + (4/5)j] 2x 10^3$ N/C Determine the flux of this field through a rectangular surface of area 0.2 m^2 situated parallel to the Y-Z plane.
6. Five point charges each of value +q coulomb are placed on five vertices of a regular hexagon of side L metres. Find the magnitude of force on a charge –q coulomb placed at the centre of the hexagon.
7. Two identical spheres having charges of opposite sign attract each other with a force of 0.108 N when separated by 0.5m. The spheres are connected by a connecting wire, which then removed and thereafter they repel each other with a force of 0.036 N. What were the intial charges on the spheres.
8. Sixty four drops of radius 0.02 m and each carrying a charge of 5μC are combined to form a bigger drop. Find how the surface density of electrification will change if no charge is lost.
9. A spherical conducting shell of inner radius r_1 and outer radius r_2 has a charge Q.
   (a) A charge q is placed at the centre of the shell. What is the surface charge density at the inner and outer surface of the shell?
   (b) Is the electric field inside cavity (with no charge) zero, even if the shell is not spherical, but has an irregular shape?
   (c) Write the expression for the electric field at a point $x > r_2$ form the centre of the shell.
10. Plot a graph showing the variation of coulomb force (F) versus $(1/r^2)$ where r is the distance between two charges of each pair of charges (1μC,2μC) and (2μC,-3μC).Interpret the graph obtained.