CUMMULATIVE TEST 1 **SUBJECT: PHYSICS**

Time Allowed: 1 ½ Hrs. **CHAPTER- ELECTROSTATICS** **M.M=25**

(1) Why must electrostatic field at the surface of a charged conductor be normal to the surface at every point? Give reason (1)

(2) Two point charges having equal charges separated by distance experience a force of 8 N. What will be the force experienced by them, if they are held in water, at the same distance? (K_{water}=80) (1)

(3) (a) Name any two basic properties of electric charge.

(b) What do Q_1+Q_2signify in electrostatics? (2)

(4) Draw an equipotential surface and corresponding electric field lines for a single point charge

(i) q> 0 (ii) q < 0. (2)

(5) (i) An electric dipole is held in a uniform electric field. Using suitable diagram show that it does not undergo any translatory motion. Derive the expression for the torque acting on it.

(ii) What would happen if the external electric field is increasing?

(a) parallel to dipole moment and (b) anti-parallel to dipole moment? (3)

(6) (i) Derive the expression for the potential energy of an electric dipole of dipole moment placed in a uniform electric field .

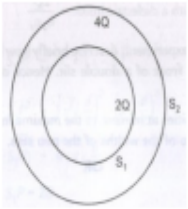
(ii) Find out the orientation of the dipole when it is in (a) stable equilibrium (b) unstable equilibrium. (3)

(7) Calculate the work done to dissociate the system of three charges placed on the vertices of an equilateral triangle of side 10 cm. Here q=1.6X10^{-19} C (3)

(8) (a) Consider two hollow concentric spheres, S1 & S2, enclosing charges 2Q & 4Q respectively as shown.

(i) Find out the ratio of the electric flux through them.

(ii) How will the electric flux through the sphere S1 change, if a medium of dielectric constant is introduced in the space inside S1 in place of air



(2)

(b) Using Gauss's law, derive an expression for the electric field intensity due to an infinitely long, straight wire of linear charge density λ C/m. (3)

(9)Using Gauss's law, obtain the expression for electric field intensity at a point due to an infinitely large, plane sheet of charge of charge density σ C/m^2. How the field is directed if the sheet is

(i) Positively charged (ii) negatively charged? (5)