PH 202 Course coordinator/ Instructor**: Alika Khare**

Problem Set no. VII **Due date: Tuesday, Mar 26, 2024**

Note: . Please submit the solutions of at least one of the problems, on Tuesday, Mar 26, 2024, during the class. The solutions can be submitted in a group of maximum of four students. Name and Roll no. of all the group members should be written clearly on the top. If solutions are found to be reasonably correct then five marks will be awarded and in case of non submission/wrong solution zero marks.

1. Find the potential and the electric field due to a uniformly polarized charged sphere, both inside as well as outside.
2. For above obtain/verify the boundary conditions for the tangential component of ***E*** and ***D*.**
3. A point charge is bedded at the center of the dielectric sphere of radius R and susceptibility χ_e. Calculate the polarization, all the bound charge densities and electric field everywhere. Give a tentative sketch of electric field as a function of r (distance from the center of the sphere).
4. A point electric dipole is embedded at the center of a dielectric sphere of radius *R* and dielectric constant *k*. Find the electric potential and hence the electric field.
5. An uncharged conducting sphere of radius *a* is coated with a dielectric material up to a radius *b*. This system is placed in an otherwise uniform electric field of very large extent. Find the electric field within the dielectric medium and obtain all the possible bound charge densities.
6. Obtained the polarizability of a gaseous atom assuming the classical model of an atom where the positively charged nucleus at the center is surrounded by uniformly distributed electronic cloud.
7. A very long cylinder of linear dielectric material is placed in an otherwise uniform electric field; the axis of the cylinder is perpendicular to the electric field. Find the potential and hence the electric field inside the cylinder.

8. Problems from D J Griffith IV th edition: 4.4, 4.10, 4.15, 4.24, 4.33, 4.34.