First and foremost we must know the basics of electricity and usage in BOARDS NEET and JEE
1. Concept of Coulomb Law and PERMITIVITY
2. Definition of 1 Coulomb
3. Principle of superposition of forces
4. Concept of electric field
5. Definition of Electric field intensity, its units
6. Concept of electric dipole, its unit and DIRECTION
7. Electric field due to dipole on AXIAL and EQUATORIAL LINE
8. Torque on dipole
9. Potential energy of dipole, STABLE and UNSTABLE equilibrium
10. Statement of Gauss Law and concept of Gaussian Surface
11. Electric field due to linear charge and areal charge distribution
12. Concept of spherical SHELL, SOLID CONDUCTOR and UNIFORMLY CHARGED Sphere

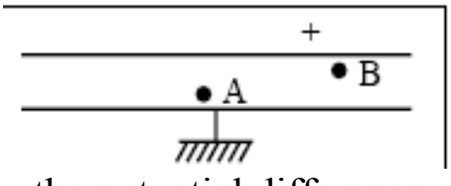
LIST OF DERIVATIONS or STRAIGHT QUESTIONS

1. Derive an expression for the electric field at a point on the axial position of an electric dipole.
2. Derive an expression for the electric field at a point on the equatorial position of an electric dipole.
3. State Gauss theorem and apply it to find the electric field at a point due to (a) a line of charge (b) A plane sheet of charge (c) A Charged spherical conducting shell
4. State Coulomb's law and express it in vector form. Derive it using Gauss theorem.
5. Derive an expression for the torque on an electric dipole in a uniform electric field.
6. Derive an expression for the work done in rotating an electric dipole in a uniform electric field

REVISION DAY 01

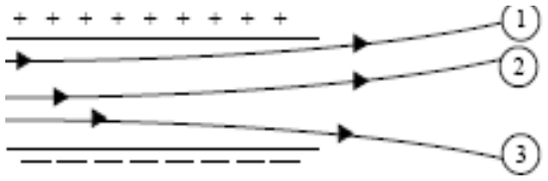
1. State Coulomb's law of force in electrostatics.

2. Name any two basic properties of electric charge.



3. In a parallel plate capacitor the potential difference of 100 V is maintained between the plates. What will be the electric field at points A and B?

4. In a medium the force of attraction between two point electric charges, distance *d* apart is F. What distance apart should these be kept in the same medium so that the force between them becomes (i) 3F, (ii) F/3
5. In an electric field an electron is kept freely. If the electron is replaced by a proton, what will be the relationship between the forces experienced by them?
6. Give the S.I. unit of electric field intensity Is electric field intensity a scalar or a vector quantity?
7. Draw a diagram to show lines of force in a plane containing two equal point charges of opposite sign, separated by a small distance. Giving reason, indicate on the diagram a point where a small positive charge experiences a force parallel to the line joining the two charges.
8. Derive an expression for the electric field intensity at any point along the axial line of an electric dipole.
9. Define 'intensity of electric field' at a point. At what points is the electric dipole field intensity parallel to the line joining the charges?
10. An electric dipole is held at an angle θ in a uniform external electric field 'E'. Will there be any (i) net translating force (ii) torque acting on it? Explain what happens to the dipole on being released.
11. Define the term electric dipole moment. Derive an expression for the total work done in rotating the dipole through an angle θ in uniform electric field 'E'.

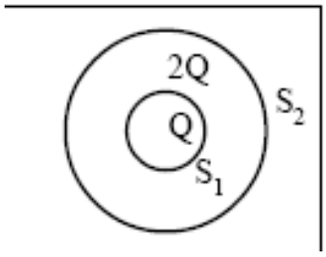


12. Figure given below shows tracks of three charged particles in uniform electrostatic field. Give the signs of the three charges. Which particle has the highest charge to mass ratio? Explain.
13. Calculate the electric field intensity due to an electric dipole at a point on its equatorial plane.
14. A hollow charged conductor has a tiny hole cut into its surface. Show that the electric field in the hole is $(\sigma/2\varepsilon_0)$ **n** where **n** is the unit vector in the outward normal direction and is the surface charge density near the hole.

END of DAY 01

DAY 2: Gauss's theorem and applications

15. Using Gauss's law, show that no electric field intensity exists inside a hollow charged conductor.
16. A charge of 12 μC is given to a hollow metallic sphere of radius 0.1 m. Find the potential at (i) the surface of the sphere, and (ii) the centre of the sphere.
17. A spherical Gaussian surface encloses a charge of 8.85×10^{-8} C. (i) Calculate the electric flux passing through the surface (ii) If the radius of the Gaussian surface is doubled, how would the flux change?



18. S_1 and S_2 are two hollow concentric sphere enclosing charges Q and 2Q respectively as shown in figure. (i) What is the ratio of the electric flux through S_1 and S_2? (ii) How will the electric flux through the sphere S_1 change, if a medium of dielectric constant 5 is introduced in the space inside S1 in place of air?

19. State Gauss' theorem in electrostatics. Apply this theorem to calculate the electric field due to an infinite plane sheet of charge.

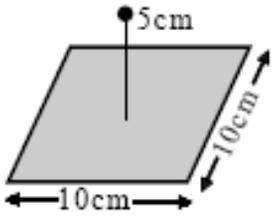
20. State Gauss' theorem in electrostatics and express it mathematically. Using it, derive an expression for electric field intensity at a point outside/inside a hollow charged conducting sphere.

21. Define the term electric flux. State its unit. A sphere S_1 of radius r_1 encloses a charge Q. If there is another concentric sphere S_2 of radius r_2 ($r_2 > r_1$) and there be no additional charges between S_1 and S_2, find the ratio of electric flux through S_1 and S_2.

22. State Gauss' theorem. Give its mathematical expression. Derive an expression for the electric field intensity at any point due to an infinite plane sheet of charge density σ C/m^2.

23. Derive expression for the electric field due to a uniformly charged spherical shell at point (i) inside and (ii) outside the shell.

24. A long charged cylinder of linear charged density λ is surrounded by a hollow co − axial conducting cylinder. What is the electric field in the space between the two cylinders?



25. A point charge + 10 μC is a distance 5 cm directly above the centre of square of side 10 cm as shown in the figure. What is the magnitude of the electric flux through the square

26. Electric charge is uniformly distributed on the surface of a spherical balloon. Show how the value of electrical intensity and potential vary (i) on the surface, (ii) inside and (iii) outside. END of DAY 02

SOLVED 1.8, 1.9, 1.10, 1.11

UNSOLVED 6, 8, 10, 15, 16, 17, 18, 19, 20, 22, 23