HOLIDAY HOME WORK (SUMMER VACATION)
CLASS - XII
SUBJECT - PHYSICS

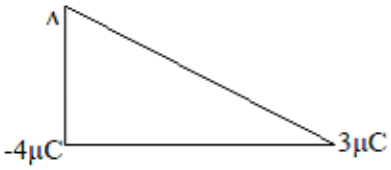
Two Marks Question:-

1. How does the force between the two charges vary when
(a) The system is immersed in a medium.
(b) When the distance between them is halved?
2. How does the electric flux, electric field enclosing a given charge vary when the area enclosed by the charge is doubled?
3. Two electric lines never cross each other. Why?
4. Why electric field lines
(i) Can never intersect one another?
(ii) Cannot for closed loops sometimes?
(iii) Cannot have break in between?
5. The electric field in a certain region of space is = 10^4 NC^{-1} $\hat{i}$. How much is the flux passing through an area 'A' if it is a part of XY plane, XZ plane, YZ plane, making an angle 30^0 with the axis?
6. An electric dipole ±4μC is kept at co-ordinate points (1, 0, 4) are kept at (2,-1, 5), the electric field is given by = 20 NC^{-1}. Calculate the torque on the dipole.
7. Two charges 5μC, -3μC are separated by a distance of 40 cm in air. Find the location of a point on the line joining the two charges where the electric field is zero.
8. Show diagrammatically the configuration of stable and unstable equilibrium of an electric dipole ( ) placed in a uniform electric field (E).
9 . Plot a graph showing the variation of coulomb force F versus where r is the distance between the two charges of each pair of charges: (1μC, 2μC) and (2μC, -3μC) .
10. Calculate the force between two alpha particles kept at a distance of 0.02mm in air.
11. Using the mirror formula show that a virtual image is obtained when an object is placed in between the principal focus and pole of the concave mirror.
12. Plot a graph between 1/u and 1/v for a concave mirror. What does the slope of the graph yield?
13. Find the position of an object, which when placed in front of a concave mirror of focal length 20cm, produces a virtual image which is twice the size of the object.
14. Using the mirror formula show that for a concave mirror, when the object is placed at the centre of curvature, the image is formed at the centre of curvature.
15. Which of the following properties of light: Velocity, wavelength and frequency, changes during the phenomenon (i) reflection (ii) refraction
16. Show that a concave lens made up of glass when placed in air can act as a converging lens if and only if the refractive index of air is greater than that of glass.
17. Calculate the critical angle for glass air surface, if a ray falling on the surface from air, suffers a deviation of 15^0 when the angle of incidence is 40^0.

Three marks questions:-

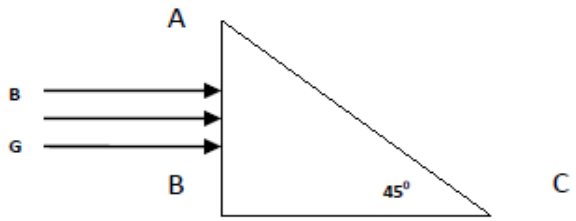
18. A charge +Q fixed on the Y axis at a distance of 1m from the origin and another charge +2Q is fixed on the X axis at a distance of 2m from the origin. A third charge – Q is placed at the origin. What is the angle at which it moves?

19. Two electric charges 3μC, -4μC are placed at the two corners of an isosceles right angled triangle of side 1 m as shown in the figure. What is the direction and magnitude of electric field at A due to the two charges?



20. An object O is placed in rarer medium . Draw a ray diagram for the image formation of the object for the refraction through a spherical surface convex towards rarer medium and hence deduce a relation between u, v and R .

21.



Three rays of light red (R) green (G) and blue (B) are incident on the surface of a right angled prism as shown in figure. The refractive indices for the material of the prism for red green and blue are 1.39, 1.43 and 1.47 respectively. Trace the path of the rays through the prism. How will the situation change if the rays were falling normally on one of the faces of an equilateral prism?

22. An electric dipole is placed in a uniform electric field $\vec{E}$ making an angle θ with the field. What are the (i) net force and (ii) the torque in the dipole? What will happen if the dipole is left free in the field?

23.

ABC is an equilateral triangle of side 10 cm. D is the mid point of BC, charge 100 μC, – 100 μC and 75 μC are placed at B, C and D respectively. What is the force experienced by a 1 μC positive charge placed at A?

24.

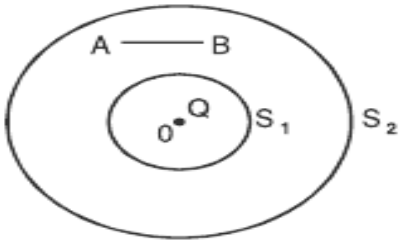
Define electric flux. Write its SI unit. An electric flux of ϕ units passes normally through a spherical Gaussian surface of radius r, due to point charge placed at the centre.

(1) What is the charge enclosed by Gaussian surface?

(2) If radius of Gaussian surface is doubled, how much flux will pass through it?

25.

In the figure shown, calculate the total flux of the electrostatic field through the sphere S_1 and S_2. The wire AB shown of length l has a liner charge density λ given $\lambda = kx$ where x is the distance measured along the wire from end A.



26.

A convex lens made up of glass of refractive index 1.5 is dipped, in turn, in (*i*) a medium of refractive index 1.65, (*ii*) a medium of refractive index 1.33.

(*a*) Will it behave as a converging or a diverging lens in the two cases?

(*b*) How will its focal length change in the two media?

FIVE MARKS QUESTIONS :-

27.

Derive an expression for the strength of electric field intensity at a point on the axis of a uniformly charged circular coil of radius R carrying charge Q.

28.

Using Gauss's theorem in electrostatics, deduce an expression for electric field intensity due to a charged spherical shell at a point (i) inside (ii) on its surface (iii) outside it. Graphically show the variation of electric field intensity with distance from the centre of shell.

29.

Derive an expression for torque experienced by dipole placed in uniform electric field. Hence define electric dipole moment.

What should be the position of charge $q = 5\mu C$ for it to be in equilibrium on the line joining two charges $q_1 = -4\ \mu C$ and $q_2 = 16\ \mu C$ separated by 9 cm. Will the position change for any other value of charge q? (9 cm

30.

Use the mirror equation to show that

(*a*) an object placed between f and $2f$ of a concave mirror produces a real image beyond $2f$.

(*b*) a convex mirror always produces a virtual image independent of the location of the object.

(*c*) an object placed between the pole and focus of a concave mirror produces a virtual and enlarged image.