

WORK SHEET 3

Subject: PHYSICS

Class: XII

Date : 5.5.20

Chapter : Electrostatics

Topic: Flux, Gauss's Theorem, E for thin spherical shell, graph.

Multiple Choice Questions:

1X15=15

1. The electric flux linked with a surface becomes maximum if the angle between the field lines and normal to the surface is

- a) 0° b) 45° c) 90° d) 180°

2. A circular plate of radius r is placed parallel to a uniform electric field of intensity E . The flux linked with the circular plate is

- a) zero b) $E \times \pi r^2$ c) $E \times 2\pi r$ d) $E \times 4\pi r^2$

3. If the inward and outward electric flux through a closed surface be ϕ_1 and ϕ_2 , the charge inside the closed surface is

- a) $(\phi_1 - \phi_2) \epsilon_0$ b) $(\phi_2 - \phi_1) \epsilon_0$ c) $(\phi_1 + \phi_2)/\epsilon_0$ d) $(\phi_2 - \phi_1)/\epsilon_0$

4. A charge placed at a distance from an electric dipole on its axis experiences a force F . If the distance be doubled, the force will become

- a) $2F$ b) $F/2$ c) $F/4$ d) $F/8$

5. What is the unit of electric flux?

- a) V/m b) $V \cdot m$ c) $V \cdot m^2$ d) V/m^2

6. Mathematical form of Gauss's theorem is

- a) $\phi = q/\epsilon_0$ b) $\phi = q \epsilon_0$ c) $\phi = E S$ d) $\phi = E / S$

7. The variation of electric field intensity with distance r from the centre of a thin charged spherical shell of radius R is

(i) $E = 0$ ($r < R$) ; (ii) $E = 1/4\pi\epsilon_0 \cdot q/R^2$ ($r = R$) ; (iii) $E = 1/4\pi\epsilon_0 \cdot q/r^2$ ($r > R$)

a) only (i) is correct b) Only (ii) is correct c) only (iii) is correct d) all are correct

8. Electric field intensity (E) due to a thin spherical shell of charge at a distance r ($r > R$) from the centre of the sphere is given by

- a) $E = (1 / 4\pi\epsilon_0 \cdot q/r^2)$ b) $4\pi\epsilon_0 (q/r^2)$ c) $4\pi\epsilon_0$ d) $qr^2 / 4\pi\epsilon_0$

9. Intensity at any point within solid spherical charged conductor is

- a) zero b) $4\pi R^2$ c) $1/4\pi R^2$ d) $1/4\pi R$

10. A spherical shell of radius 20 cm has $20\mu\text{C}$ charge placed in vacuum. Calculate the electric intensity at a distance of 15 cm

- a) 0 b) 1 c) 2 d) 3

11. An electric field is expressed as $\mathbf{E} = (5\mathbf{i} + 3\mathbf{j} + 2\mathbf{k})$ unit. Find out the electric flux across an area 200 unit on the yz – plane in that field.

- a) 10 unit b) 100 unit c) 1000 unit d) 1 unit

12. Gauss's theorem is valid for

- a) stationary charge b) moving charge c) both static and moving charge d) none of these

13. A hemisphere of radius r is placed in a uniform electric field intensity E . How much electric flux passes Through it ?

- a) $2\pi rE$ b) $4\pi r^2E$ c) $2\pi r^2E$ d) πr^2E

14. S_1 and S_2 are two parallel concentric spheres ($R_2 > R_1$) enclosing charges Q and $2Q$ respectively. What is the ratio of the electric flux through S_1 and S_2 ?

- a) $1/3$ b) $3/1$ c) $2/3$ d) $3/2$

15. A sphere of radius 10 cm has an unknown charge. If the electric field 20 cm from the centre of the sphere is $2 \times 10^4 \text{ NC}^{-1}$ and points radially inward. What is the net charge on the sphere?

- a) $q = 88.9 \text{ nC}$ b) $q = - 88.9 \text{ nC}$ c) $q = 0 \text{ nC}$ d) $q = 90 \text{ nC}$

Ambarnath Banerjee