# ST. LAWRENCE HIGH SCHOOL

FOR GOD AND COUNTRY

A JESUIT CHRISTIAN MINORITY INSTITUTION

## SOLUTION TO 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°

Ans : (a) 0°

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 x $\pi r^2$ c) E x $2\pi r$ d)E x $4\pi r^2$

Ans: (a) zero

3. If the inward and outward electric flux through a closed surface be $\phi_1$ and $\phi_2$ ,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) $(\phi_2 - \phi_1)/\epsilon_0$

Ans : (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

Ans: (d) F/8

5. What is the unit of electric flux ?

a) v/m b) v m c) v $m^2$ d) $v/m^2$

Ans: (b) v m

6. Mathematical form of Gauss's theorem is

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

Ans (a ) $\phi = q / \epsilon_0$

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

Ans : ( 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) $E= ( 1 / 4\pi\epsilon_0 ). q/r^2$ b) $4\pi\epsilon_0 ( q/r^2 )$ c) $4\pi\epsilon_0$ d) $qr^2 / 4\pi\epsilon_0$

Ans : ( a) $E =( 1 / 4\pi\epsilon_0 ). q/ r^2$

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)$1/4\pi R$

Ans: (a) zero

10. A spherical shell of radius 20 cm has 20μC charge placed in vacuum. Calculate the electric intensity at a distance of 15 cm

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

Ans : (a) 0

11. An electric field is expressed as **E** = ( 5**i**+3**j** +2**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

Ans : (c) 1000 unit

12. Gauss's theorem is valid for

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

Ans : (c) both static and moving charge

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) $\pi r^2E$

Ans : (d) $\pi r^2E$

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

Ans : (a) 1/3

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 x $10^4$ $NC^{-1}$ and points radially inward. What is the net charge on the sphere?

a) q = 88.9 nC b) q = - 88.9 nC c) q = 0 nC d) q = 90 nC

Ans: (b) -88.9 nC

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