CHAPTER-1
ELECTRIC CHARGES AND FIELDS

1) An isolated solid metallic sphere is given $+Q$ charge. The charge will be distributed on the sphere

(A) Uniformly but only on surface

(B) Only on surface but non-uniformly

(C) Uniformly inside the volume

(D) Non-uniformly inside the volume

2) There are two metallic spheres of same radii but one is solid and the other is hollow, then

(A) Solid sphere can be given more charge

(B) Hollow sphere can be given more charge

(C) They can be charged equally

(D) None of the above

3) The value of electric permittivity of free space is

(A) $9 \times 10^9 NC^2/m^2$ (B) $8.85 \times 10^{-12} Nm^2/C^2 sec$

(C) $8.85 \times 10^{-12} C^2/Nm^2$ (D) $9 \times 10^9 C^2/Nm^2$

4) Number of electrons in one coulomb of charge will be

(A) 5.46×10^{29} (B) 6.25×10^{18}

(C) $1.6 \times 10^{+19}$ (D) 9×10^{11}

5) One metallic sphere A is given positive charge whereas another identical metallic sphere B of exactly same mass as of $A$is given equal amount of negative charge. Then

(A) Mass of A and mass of B still remain equal (B) Mass of A increases

(C) Mass of B decreases (D) Mass of B increases

6) Two charged spheres separated at a distance d exert a force Fon each other. If they are immersed in a liquid of dielectric constant 2, then what is the force (if all conditions are same)

(A) $\frac{F}{2}$ (B) F

(C) $2F$ (D) $4F$

7) When 10^{19} electrons are removed from a neutral metal plate, the electric charge on it is

(A) $-1.6\ C$ (B) $+1.6\ C$

(C) $10^{+19} C$ (D) $10^{-19} C$

8) The dielectric constant of metal is

(A) 1 B) ∞

(C) 0 (D) $none\ of\ these$

9) When a glass rod is rubbed with silk then, glass rod

(A) Gains electrons from silk (B) Gives electrons to silk

(C) Gains protons from silk (D) Gives protons to silk

10) If E is the electric field intensity of an electrostatic field, then the electrostatic energy density is proportional to

(A) E (B) E^2

(C) $1/E^2$ (D) E^3

11) Conduction electrons are almost uniformly distributed within a conducting plate. When placed in an electrostatic field $\vec{E}$, the electric field within the plate

(A) is zero (B) Depends upon E

(C) Depends upon $\vec{E}$ (D) Depends upon the atomic number of the conducting element

12) The electric field near a sheet having a uniform surface charge density σ is given by

(A) $\frac{\sigma}{\varepsilon_0}$ and is parallel to the surface

(B) $\frac{2\sigma}{\varepsilon_0}$ and is parallel to the surface

(C) $\frac{\sigma}{\varepsilon_0}$ and is normal to the surface

(D) $\frac{\sigma}{2\varepsilon_0}$ and is normal to the surface

13) The unit of intensity of electric field is

(A) $Newton/Coulomb$ (B) $Joule/Coulomb$

(C) $Volt - metre$ (D) $Newton/metre$

14) Which of the following is deflected by electric field

(A) X-rays (B) γ -rays

(C) Neutrons (D) α -particles

15) An electron is moving towards *x*-axis. An electric field is along *y*-direction then path of electron is

(A) Circular (B) Elliptical

(C) Parabola (D) None of these

16) A proton enters in an electric field with its velocity in the direction of the electric lines of force. Then

(A) The path of the proton will be a circle

(B) The path of the protonwill be a parabola

(C) The path of the proton will be a straight line

(D) The path of the proton will be helix

17) An electric dipole when placed in a uniform electric field E will have minimum potential energy, if the direction of dipole moment makes the following angle with E

(A) π (B) $\pi/2$

(C) Zero (D) $3\pi/2$

18) An electric dipole is kept in uniform electric fiel(D) It experiences

(A) A force and a torque (B) A force but not a torque

(C) A torque but not a force (D) Neither a force nor a torque

19) An electric dipole is kept in non-uniform electric fiel(D) It experiences

(A) A force and a torque (B) A force but not a torque

(C) A torque but not a force (D) Neither a force nor a torque

20) The electric field due to a dipole at a distance r on its axis is

(A) Directly proportional to r^3

(B) Inversely proportional to r^3

(C) Directly proportional to r^2

(D) Inversely proportional to r^2

21) The torque acting on a dipole of moment $\vec{P}$ in an electric field $\vec{E}$ is

(A) $\vec{P} \cdot \vec{E}$ (B) $\vec{P} \times \vec{E}$

(C) Zero (D) $\vec{E} \times \vec{P}$

22) The electric field at a point on axial line of a dipole and direction of the dipole moment

(A) Will be parallel (B) Will be in opposite direction

(C) Will be perpendicular (D) Are not related

23) The electric field at a point on equatorial line of a dipole and direction of the dipole moment

(A) Will be parallel

(B) Will be in opposite direction

(C) Will be perpendicular

(D) Are not related

24) If E_a be the electric field strength of a short dipole at a point on its axial line and E_e that on the equatorial line at the same distance, then

(A) $E_e = 2E_a$ (B) $E_a = 2E_e$

(C) $E_a = E_e$ (D) None of the above

25) A region surrounding a stationary electric dipoles has

(A) Magnetic field only

(B) Electric field only

(C) Both electric and magnetic fields

(D) No electric and magnetic fields

26) Electric field at a point varies as r^0 for

(A) An electric dipole

(B) A point charge

(C) A plane infinite sheet of charge

(D) A line charge of infinite length

27) For a given surface the Gauss' law is stated as $\oint E \cdot ds = 0$. From this we can conclude that

(A) E is necessarily zero on the surface

(B) E is perpendicular to the surface at every point

(C) The total flux through the surface is zero

(D) The flux is only going out of the surface

28) According to Gauss' Theorem, electric field of an infinitely long straight wire is proportional to

(A) r (B) $\frac{1}{r^2}$

(C) $\frac{1}{r^3}$ (D) $\frac{1}{r}$

29) The S.I. unit of electric flux is

(A) *Weber*

(B) *Newton per coulomb*

(C) *Volt×metre*

(D) *Joule* per *coulomb*

30) Gauss's law in electrostatics should be invalid if

(A) There were magnetic monopoles

(B) The inverse square law were not exactly true

(C) The velocity of light were not a universal constant

(D) None of these

31) A spherical conductor has the charge on it. Then total flux emitted through the gaussian surface drawn around conductor will be

(A) $\frac{1}{\varepsilon_0} \times$ (the charge enclosed by surface)

(B) $\varepsilon_0 \times$ (charge enclosed by surface)

(C) $\frac{1}{4\pi\varepsilon_0} \times$ (charge enclosed by surface)

(D) 0

32) Gauss's law is true only if force due to a charge varies as

(A) r^{-1} (B) r^{-2}

(C) r^{-3} (D) r^{-4}

33) A metallic sphere of radius R has a uniform distribution of electric charge on its surface. At a distance x from its centre, for $x > R$, the electric field is directly proportional to

(A) $\frac{1}{x^2}$ (B) $\frac{1}{x}$

(C) x (D) x^2

KEY ANSWERS;

Question	Option	Question	Option	Question	Option	Question	Option
1	**A**	11	**A**	21	**B**	31	**A**
2	**C**	12	**D**	22	**A**	32	**B**
3	**C**	13	**A**	23	**B**	33	**A**
4	**B**	14	**D**	24	**B**		
5	**D**	15	**C**	25	**B**		
6	**A**	16	**C**	26	**C**		
7	**B**	17	**C**	27	**C**		
8	**B**	18	**C**	28	**D**		
9	**B**	19	**A**	29	**C**		
10	**B**	20	**B**	30	**B**		

FILL IN THE BLANKS

1) A body can be charged by the method of _____.
Ans: Induction

2) _____ is the simple apparatus with which the presence of electric charge on a body is detected
Ans: Electroscope

3) SI unit of linear charge density is _____.
Ans: coulomb per metre

4) The direction of electric field is _____ from the positive charge.
Ans: away

5) The direction of electric field is _____ the negative charge.
Ans: towards

6) Electric Field lines do not exist inside a _____.
Ans: conductor

7) If ($q_1q_2<0$) then nature of force between charges is _____.
Ans: attractive

8) SI unit of dipole moment is _____.
Ans: coulomb-metre