Unit 1,2 and 3 One Mark Questions With Answer

12th Standard CBSE

Physics

1) At a particular point, electric field depends upon
   (a) Source charge Q only (b) test charge q_o only (c) both Q and q_0
   (d) neither Q nor q_o
2) The SI unit of electric field intensity is
   (a) N (b) N/C (c) C/m^2 (d) N/m^2
3) Electric field due to a single charge is
   (a) asymmetric (b) cylindrically symmetric (c) spherically symmetric
   (d) None of the above
4) Electric dipole moment is
   (a) scalar (b) neither scalar vector (c) a vector directed from -q to +q
   (d) a vector directed from +q to -q
5) Electric field intensity (E) due to an electric dipole varies with distance (r) of the point from the centre of dipole as:
   (a) $E\alpha\frac{1}{r}$ (b) $E\alpha\frac{1}{r^4}$ (c) $E\alpha\frac{1}{r^2}$ (d) $E\alpha\frac{1}{r^3}$
6) At a given distance from the centre of electic dipole, field intensity on axial line is k times the field intensity on equatorial line, where K=
   (a) 2 (b) 3 (c) 4 (d) 1
7) Force $\vec{F}$ acting on a test charge q_o in a uniform electric field $\vec{E}$ is
   (a) $\vec{F} = q_o\vec{E}$ (b) $\vec{F} = \frac{\vec{E}}{q_o}$ (c) $\vec{F} = \frac{\vec{q_o}}{\vec{E}}$ (d) $\vec{F} = q_o^2\vec{E}$
8) The correct relation between electric intensity E and electric potential V is
   (a) $E = -\frac{dV}{dr}$ (b) $E = \frac{dV}{dr}$ (c) $V = -\frac{dE}{dr}$ (d) $V = \frac{dE}{dr}$
9) 1 G eV = x eV, where x is
   (a) 10^6 (b) 10^3 (c) 10^{12} (d) 10^9
10) A charge of $10\mu C$ lies at the centre of a square. Work done in carrying a charge of $2\mu C$ from one corner of square to the diagonally opposite corner is
   (a) 20 J (b) 5 J (c) zero (d) 20 μ J
11) A uniform electric field of 100 N/C exists in vertically upward direction. The decrease in electric potential as one goes up through a height of 20cm is
   (a) 20 V (b) 120 V (c) 5 V (d) Zero
12) Electric potential V and electric flux ϕ are
   (a) both vectors (b) both scalars (c) V is scalar, ϕ is vector
   (d) V is vector, ϕ is scalar
13) Which of the following is not an insulator?
   (a) glass (b) rubber (c) ebonite (d) human body

14) An object is charged when it has a charge imbalance, which means the
(a) object contains no electrons (b) object contains no protons
(c) object contains equal number of electrons and protons
(d) object contains unequal number of electrons and protons.

15) The cause of charging is actual transfer of protons
(a) actual transfer of protons (b) actual transfer of electrons
(c) actual transfer of neutrons (d) none of the above

16) The cause of quantisation of electric charge is
(a) transfer of electrons (b) transfer of protons
(c) transfer integral number of electrons (d) none of the above

17) What is not true?
(a)
It is not possible to create or destroy net charge carries by any isolated system
(b) Charges can be created or destroyed in equal and unlike pairs only
(c) proper signs have to be used while adding the charges in a system
(d)
Excess of electrons over protons in a body is responsible for positive charge of the body.

18) The value of absolute electrical permittivity of free space is
(a) $9 \times 10^{9} Nm^{2}C^{-2}$ (b) $9 \times 10^{-9} Nm^{2}C^{-2}$ (c) $8.85 \times 10^{-12} C^{2}N^{-1}m^{-2}$
(d) $8.85 \times 10^{-12} C^{2}Nm^{-2}$

19) When a conductor is held in an electric field, the field inside the conductor is always
(a) positive (b) negative (c) constant (d) zero

20) When two capacitors charged to different potentials are connected by a conducting wire, what is not true?
(a) charge lost by one is equal to charge gained by the other
(b) potential lost by one is equal to potential gained by the other
(c) some energy is lost (d) both the capacitor acquire a common potential

21) In polar molecules, the centres of positive and negative charges of molecule do not coincide. The statement is always
(a) true (b) false

22) If $\oint E.ds = 0$ over a surface, then
(a) the electric field inside the surface and on it is zero
(b) the electric field inside the surface is necessarily uniorm
(c)
the number of flux lines entering the surface must be equal to the number of flux lines leaving it
(d) all charges must necessarily be outside the surface

23) If there were only one type of charge in the universe, then
(a) $\oint_s \vec{E}.\vec{ds} \neq 0$ on any surface (b) $\oint_s \vec{E}.\vec{ds} = 0$ if the charge is outside the surface
(c) $\oint_s \vec{E}.\vec{ds}$ could not be defined
(d) $\oint_s \vec{E}.\vec{ds} = \frac{q}{\epsilon_o}$ if charges of magnitude q were inside the surface

24) The magnetic field at a perpendicular distance of 2 cm from an infinite straight current carrying conductor is $2X10^{-6}$ T. The current in the wire is

(a) 0.1 A (b) 0.2 A (c) 0.4 A (d) 0.8 A

25) Current carrying wire produces

(a) Only electric field (b) Only magnetic field

(c) Both electric and magnetic field (d) None of the above

26) A circular coil of n turns and radius r carries a current I. The magnetic field at the centre is

(a) $\frac{\mu_o nI}{r}$ (b) $\frac{\mu_o nI}{2r}$ (c) $\frac{2\mu_o nI}{r}$ (d) $\frac{\mu_o nI}{4r}$

27) Ampere's circuital law can be derived from

(a) Ohm's law (b) Biot-Savart's law (c) Kirchhoff's law (d) Gauss's law

28) A circular coil carrying current behaves as a

(a) bar magnet (b) horse shoe magnet (c) magnetic shell (d) solenoid

29) Two charged particles traverse identical helical paths in a completely opposite sense in a uniform magnetic field $\vec{B} = B_0\hat{k}$.

(a) They have equal z-components of momenta

(b) They must have equal charges

(c) They necessarily represent a particle anti-particle pair.

(d) The charge to mass ratio satisfy $\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$

30) An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?

(a) The electron will be accelerated along the axis

(b) The electron path will be circular about the axis.

(c) The electron will experience a force at 45° to the axis and hence execute a helical path.

(d) The electron will continue to move with uniform velocity along the axis of the solenoid.

31) An electron moving in a circular orbit of radius r makes n rotations per second. The magnetic field produced at the centre has magnitude

(a) zero (b) $\frac{\mu_0 n^2 e}{r}$ (c) $\frac{\mu_0 ne}{2r}$ (d) $\frac{\mu_0 ne}{2\pi r}$

32) The magnetic field of earth can be modeled by that of a point dipole placed at the center of the earth. The dipole axis makes an angle of 11.3°with the axis of the earth. At Mumbai, declination is nearly zero. Then,

(a) the declination varies between 11.3°W to 11.3° (b) the least declination is 0°

(c) the plane defined by dipole axis and earth axis passes through Greenwich.

(d) declination averaged over the earth must be always negative.

33) In a permanent magnet at room temperature

(a) the magnetic moment of each molecule is zero

(b) the individual molecules have a non-zero magnetic moment which is all perfectly aligned

(c) domains are partially aligned (d) domains are all perfectly aligned.

34) Consider the two idealized systems: (i) a parallel plate capacitor with large and small separation and (ii) a long solenoid of length L > > R, radius of the cross-section. In (i) $\vec{E}$ is ideally treated as a constant between plates and zero outside. In (ii) magnetic field is constant inside the solenoid and zero outside. These idealized assumptions, however, contradict fundamental law as below:

(a) case (i) contradicts Gauss's law for electrostatic fields.

(b) case (ii) contradicts Gauss's law for magnetic fields.

(c) case (i) agrees with $\oint \vec{E}.d\vec{l} = 0$ (d) case (ii) contradicts $\oint \vec{H}.d\vec{l} = l_{en}$

35) A proton and an α-particle moving with same velocity enter into a uniform magnetic field, acting normal to the plane of their motion. The ratio of radii of the circular paths described by the proton and α-particle is

(a) 1 : 2 (b) 1 : 4 (c) 1 : 16 (d) 4 : 1

36) An electron is travelling along the X-direction. It encounters the magnetic field in the Y-direction. Its subsequent motion will be

(a) straight line along X-direction (b) a circle in the X-Z plane

(c) a circle in the YZ plane (d) a circle in the XY plane

37) A charged particle goes undeflected in a region containing electric and magnetic field. It is possible that

(a) $\vec{E} \parallel \vec{B}$ but $\vec{v}$ is not parallel to $\vec{E}$ (b) $\vec{v} \parallel \vec{B}$ but $\vec{E}$ is not parallel to $\vec{B}$

(c) $\vec{E} \parallel \vec{B}$, $\vec{v} \parallel \vec{E}$ (d) $\vec{E}$ is not parallel to $\vec{B}$ and $\vec{v}$

38) A proton and an alpha particle both enter a region of uniform magnetic field B, moving at right angles to the field B. If the radius of circular orbits for both the particles is equal and the kinetic energy acquired by proton is 1 MeV, the energy acquired by the alpha particles will be :

(a) 1 MeV (b) 4 MeV (c) 0.5 MeV (d) 1.5 MeV

39) A charged particle with charge q enters a region of constant, uniform and mutually orthogonal fields $\vec{E}$ *and* $\vec{B}$ with a velocity $\vec{v}$ perpendicular to both $\vec{E}$ *and* $\vec{B}$, and comes out without any change in magnitude or direction of $\vec{v}$. Then

(a) $\vec{v} = \vec{B} \times \vec{E}/E^2$ (b) $\vec{v} = \vec{E} \times \vec{B}/B^2$ (c) $\vec{v} = \vec{B} \times \vec{E}/B^2$ (d) $\vec{v} = \vec{E} \times \vec{B}/E^2$

40) Proton, Deuteron and alpha particle of the same kinetic energy are moving in circular trajectories in a constant magnetic field. The radii of proton, deuteron and alpha particle are respectively r_p, r_d *and* r_α. Which one of the following relations is correct?

(a) $r_\alpha = r_p = r_d$ (b) $r_\alpha = r_p < r_d$ (c) $r_\alpha > r_d > r_p$ (d) $r_\alpha = r_d > r_p$

41) When a proton is released from rest in a room, it starts with an initial acceleration a_0 towards west. When it is projected towards north with a speed v_0 it moves with an initial acceleration 3 a_0 towards west. The electric and magnetic fields in the room are

(a) $\frac{ma_0}{e}east, \frac{3ma_0}{ev_0}down$ (b) $\frac{ma_0}{e}west, \frac{2ma_0}{ev_0}up$ (c) $\frac{ma_0}{e}west, \frac{2ma_0}{ev_0}down$ (d) $\frac{ma_0}{e}east, \frac{3ma_0}{ev_0}up$

42) An electron of mass M_e, initially at rest, moves through a certain distance in a uniform electric field in time t_1. A proton of mass M_p also initially at rest, takes time t_2 to move through an equal distance in this uniform electric field. Neglecting the effect of gravity, the ratio t_2/t_1 is nearly equal to

(a) 1 (b) $\sqrt{\frac{M_p}{M_e}}$ (c) $\sqrt{\frac{M_e}{M_p}}$ (d) 1836

43) Two particles each of mass m and charge q are attached to the two ends of a light rigid rod of length 2 R. The rod is rotated at constant angular speed about a perpendicular axis passing through its centre. The ratio of the magnitudes of the magnetic moment of the system and its angular momentum about the centre of the rod is

(a) q/2 m (b) q/m (c) 2 q/m (d) q/π m.

44) A galvanometer has a sensitivity of 60 division/ampere. When a shunt is used its sensitivity becomes 10 division/ampere. What is the value of shunt used if the resistance of the galvanometer is 20Ω ?

(a) 2Ω (b) 3Ω (c) 4Ω (d) 6Ω

45) In an ammeter 0.5% of main current passes through galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be

(a) G/200 (b) G/199 (c) 199 G (d) 200G.

46) The current sensitivity of a moving coil galvanometer increases by 35%, when its resistance is increased by a factor 3. The voltage sensitivity of galvanometer changes by a factor

(a) 35% (b) 45% (c) 55% (d) none of the above

47) A current of 5 A is flowing through a circular coil of diameter 14 cm having 100 turns. The magnetic dipole moment associated with this coil is :

(a) $0.077Am^2$ (b) $0.77Am^2$ (c) $7.7Am^2$ (d) $77Am^2$

48) A magnet with moment M is given. If it is bent into a semicircular form, its new magnetic moment will be :

(a) M/π (b) $M/2$ (c) M (d) $2M/\pi$

49) A magnetic needle lying parallel to a magnetic field requires W units of work to turn it through 60°. The torque required to keep the needle in this position will be

(a) 2 W (b) W (c) $\frac{W}{\sqrt{2}}$ (d) $\frac{W}{\sqrt{3}}$ (e) $\sqrt{3}W$

50) A magnetic needle suspended parallel to a magnetic field requires $\sqrt{3}J$ of work to turn it through 60°. The torque needed to maintain the needle in this position will be :

(a) $2\sqrt{3}J$ (b) $3J$ (c) $\sqrt{3}J$ (d) $\frac{3}{2}J$

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50 x 1 = 50

1) (a) Source charge Q only

2) (b) N/C

3) (c) spherically symmetric

4) (c) a vector directed from -q to +q

5) (d) $E\alpha\frac{1}{r^3}$

6) (a) 2

7) (a) $\vec{F} = q_o\vec{E}$

8) (a) $E = -\frac{dV}{dr}$

9) (d) 10^9

10) (c) zero

11) (a) 20 V

12) (b) both scalars

13) (d) human body

14) (d) object contains unequal number of electrons and protons.

15) (b) actual transfer of electrons

16) (c) transfer integral number of electrons

17) (d) Excess of electrons over protons in a body is responsible for positive charge of the body.

18) (c) $8.85 \times 10^{-12} C^2 N^{-1} m^{-2}$

19) (d) zero

20) (b) potential lost by one is equal to potential gained by the other

21) (a) true

22) (c)
the number of flux lines entering the surface must be equal to the number of flux lines leaving it

23) (b) $\oint_s \vec{E}.\overrightarrow{ds} = 0$ if the charge is outside the surface

24) (b) 0.2 A

25) (b) Only magnetic field

26) (b) $\frac{\mu_o nI}{2r}$

27) (b) Biot-Savart's law

28) (c) magnetic shell

29) (d) The charge to mass ratio satisfy $\left(\frac{e}{m}\right)_1 + \left(\frac{e}{m}\right)_2 = 0$

30) (d) The electron will continue to move with uniform velocity along the axis of the solenoid.

31) (c) $\frac{\mu_0 ne}{2r}$

32) (a) the declination varies between $11.3°$W to $11.3°$

33) (c) domains are partially aligned

34) (d) case (ii) contradicts $\oint \vec{H}.d\vec{l} = l_{en}$

35) (a) 1 : 2

36) (b) a circle in the X-Z plane

37) (c) $\vec{E} \parallel \vec{B}, \vec{v} \parallel \vec{E}$

38) (a) 1 MeV

39) (b) $\vec{v} = \vec{E} \times \vec{B}/B^2$

40) (b) $r_\alpha = r_p < r_d$

41) (c) $\frac{ma_0}{e} west, \frac{2ma_0}{ev_0} down$

42) (b) $\sqrt{\frac{M_p}{M_e}}$

43) (a) q/2 m

44) (c) 4Ω

45) (a) G/200

46) (c) 55%

47) (c) $7.7Am^2$

48) (d) $2M/\pi$

49) (e) $\sqrt{3}W$

50) (b) $3J$