

PHYSICS PRACTICE QUESTIONS

Class XII - Electrostatics, Current Electricity & Magnetism

Q1. A point 'P' lies at a distance 'r' from the midpoint of an electric dipole on its axis. The electric potential at point 'P' is proportional to:

- (a) $1/r^2$ (b) $1/r^3$
(c) $1/r^4$ (d) $1/r^{1/2}$

Q2. What is the work done in moving a test charge 'q' through a distance of 1 cm along equatorial axis of an electric dipole?

- (a) 0 (b) ∞ (c) 1 (d) -1

Q3. The electric potential 'V' at any point (x, y, z) is given by $V = 3x^2$ where x is in meters and V in volts. The electric field at point (1m, 0, 2m) is:

- (a) 6 V/m along -x-axis (b) 6 V/m along +x-axis
(c) 1.5 V/m along -x-axis (d) 1.5 V/m along +x-axis

Q4. An electric dipole consisting of charges +q and -q separated by a distance 'L' is in stable equilibrium in a uniform electric field (E). Its electrostatic potential energy is:

- (a) qLE (b) zero
(c) -qLE (d) -2qLE

Q5. The current in a device varies with time 't' as $I = 6t$ where I is in mA and 't' is in sec. The amount of charge that passes through the device during $t = 0$ s to $t = 3$ s is:

- (a) 10 mC (b) 18 mC
(c) 27 mC (d) 54 mC

Q6. A steady current flows in a copper wire of non-uniform cross-section. Physical quantities: I. Electric Field, II. Current Density, III. Drift Speed. At different points along the wire:

- (a) II and III change, but I is constant
(b) I and II change, but III is constant
(c) I and III change, but II is constant
(d) All I, II and III change

Q7. The potential difference across a cell in an open circuit is 8V. It falls to 4V, when a current of 4A is drawn from it. The internal resistance of the cell is:

- (a) $4\ \Omega$ (b) $3\ \Omega$ (c) $2\ \Omega$ (d) $1\ \Omega$

Q8. Which of the following statements is true about mobility of charge carriers in a metal?

- (a) Mobility increases with increase in applied E.F.
- (b) Mobility decreases with increase in temp.
- (c) Mobility is independent of mass of charge carriers.
- (d) Mobility increases with increase in temp.

Q9. A particle of mass (m) and charge 'q' describes a circular path of radius 'R' in a magnetic field. If its mass and charge were 2m and q/2 respectively, the radius of its path would be:

- (a) R/4
- (b) R/2
- (c) 2R
- (d) 4R

Q10. If an ammeter is to be used in place of a voltmeter, then we must connect with the ammeter a:

- (a) low resistance in parallel
- (b) low resistance in series
- (c) high resistance in parallel
- (d) high resistance in series

Q11. Two parallel conductors carrying current of 4A and 10A are placed 2.5 cm apart in vacuum. The force per unit length between them is:

- (a) 6.4×10^{-5} N/m
- (b) 6.4×10^{-2} N/m
- (c) 4.6×10^{-4} N/m
- (d) 3.2×10^{-4} N/m

Q12. The magnetic dipole moment of a current carrying coil does not depend on:

- (a) no. of turns of coil
- (b) cross-sectional area
- (c) current in the coil
- (d) material of turns

Q13. Which of the following is a diamagnetic substance?

- (a) Gadolinium
- (b) Sodium
- (c) Copper chloride
- (d) Sodium chloride

Q14. The dimension of the rate of change of magnetic flux are:

- (a) $[M L T^{-3} A]$
- (b) $[M L^2 T^{-3} A^{-1}]$
- (c) $[M L^2 T^{-2} A^{-1}]$
- (d) $[M L^2 T^{-3} A^{-2}]$

Q15. An ac voltage is given as $V = 14 \sin(314t)$ V. The average and the effective value of the voltage (in V) over a cycle are respectively:

- (a) 14 and 7
- (b) 10 and 14
- (c) 0 and 10
- (d) 10 and 0

Q16. When an alternating voltage $E = E_0 \sin(\omega t)$ is applied to a circuit, a current $I = I_0 \sin(\omega t + \phi)$ flows. The average power dissipated is:

- (a) $E_{\text{rms}} I_{\text{rms}}$
- (b) $E_0 I_0$
- (c) $E_0 I_0 / \sqrt{2}$
- (d) zero

Q17. A capacitor is charged by a battery. Between the plates, during process of charging:

- (a) only displacement current exists.
- (b) only conduction current exists.
- (c) both displacement and conduction current exist.
- (d) no current exists.

Q18. A ray of light of wavelength 600 nm propagates from air into a medium. If its wavelength in the medium becomes 400 nm, the refractive index of the medium is:

- (a) 1.4
- (b) 1.5
- (c) 1.6
- (d) 1.8

Q19. A ray of monochromatic light propagating in air is incident on the surface of water, which of the following will be the same for the reflected and refracted rays?

- (a) Energy carried
- (b) Speed
- (c) Frequency
- (d) Wavelength

Q20. A concave lens is dipped in a liquid, whose refractive index is equal to refractive index of a material of lens:

- (a) focal length becomes zero
- (b) focal length becomes infinite
- (c) power decreases
- (d) power increases

Q21. Which one of the following has negative value of susceptibility?

- (a) Nickel
- (b) Aluminium
- (c) Lead
- (d) Iron

Q22. Which of the following has permeabilities less than that of free space?

- (a) Copper
- (b) Aluminium
- (c) Copper chloride
- (d) Nickel

Q23. The magnetic susceptibility for a diamagnetic material is:

- (a) small and negative
- (b) small and positive
- (c) large and negative
- (d) large and positive

Q24. A diamagnetic substance is brought near the north or south pole of a bar magnet. It will be:

- (a) repelled by both the poles.
- (b) attracted by both the poles.
- (c) repelled by north pole and attracted by south pole.
- (d) attracted by north pole and repelled by south pole.

SECTION II - ASSERTION & REASON (CBSE / STATE BOARD PATTERN)

Q25. Assertion (A): EM waves do not require a medium for propagation.

Reason (R): EM waves are transverse waves.

- (a) Both A & R are true and R is correct explanation of A.
- (b) Both A & R are true but R is not correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

Q26. Assertion (A): A convex lens, when immersed in a liquid, disappears.

Reason (R): The refractive index of material of the lens and the liquid are equal.

- (a) Both A & R are true and R is correct explanation of A.
- (b) Both A & R are true but R is not correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

Q27. Assertion (A): Plane and convex mirror can't produce real images under any circumstance.

Reason (R): A virtual image can't serve as an object to produce a real image.

Q28. Assertion (A): Out of Infrared and radio waves, radio waves show more diffraction effect.

Reason (R): Radio waves have greater frequency than infrared waves.

Q29. Assertion (A): When a bar of copper is placed in an external magnetic field, field lines get concentrated inside.

Reason (R): Copper is a paramagnetic substance.

Q30. Assertion (A): Diamagnetic substances exhibit magnetism.

Reason (R): Diamagnetic materials do not have permanent magnetic dipole moment.

Q31. Assertion (A): When electrons drift in a conductor, it does not mean all free electrons move in the same direction.

Reason (R): Drift velocity is superimposed over large random velocities of electrons.