CLASS 12 – PHYSICS

ANSWER KEY

(SET- 1)

SECTION A

(MCQ Answers)

1. (a) N/C

2. (a) $[ML^2T^{-2}A^{-1}]$

3. (b) Electric field

4. (d) All of these

5. (c) 1/8

6. (c) Voltage increases

7. (b) Particle theory

8. (b) $1/\lambda$

9. (c) Nature of metal

10. (b) Henry

11. (b) Minimum

12. (b) Iron

Assertion–Reason Answers

13. Both A and R are true and R is correct explanation of A.

14. Both A and R are true and R is correct explanation of A.

15. Both A and R are true and R is correct explanation of A.

16. Assertion is false but Reason is true.

SECTION B

Q17. Electric Flux

Definition:

Electric flux is the total number of electric field lines passing through a surface.

Formula:

$$\Phi_E = \vec{E} \cdot \vec{A}$$

SI Unit:

N m²/C

Q18. Gauss's Law

Statement:

The total electric flux through a closed surface is equal to $\frac{1}{\varepsilon_0}$ times the net charge enclosed inside it.

Mathematical Form:

$$\oint \vec{E} \cdot d\vec{A} = \frac{Q_{enclosed}}{\varepsilon_0}$$

Q19. Resistivity

Definition:

Resistivity is the resistance offered by a conductor of unit length and unit cross-sectional area.

$$\rho = \frac{RA}{L}$$

Depends on:

- Nature of material
- Temperature

Q20. Nuclear Fission

Nuclear fission is the process in which a heavy nucleus splits into two lighter nuclei along with release of energy and neutrons.

Example:

$$^{235}U + n \rightarrow Fission\ P \qquad\qquad roducts + Energy$$

Q21. Properties of Electromagnetic Waves

1. They are transverse waves.

2. They travel with speed $3 \times 10^8\ m/s$ in vacuum.

SECTION C

Q22. Electric Field Due to Point Charge

Consider a point charge q.

According to Coulomb's law:

$$F = \frac{1}{4\pi\varepsilon_0}\frac{qQ}{r^2}$$

Electric field,

$$E = \frac{F}{Q}$$
$$E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$$

Direction is radially outward for positive charge.

Q23. Working of Potentiometer

Principle:

When a constant current flows through a uniform wire, potential drop across any length is proportional to its length.

$$V \propto L$$

It is used to measure EMF and compare EMFs.

At null point:

$$E = kL$$

Q24. Relation Between Drift Velocity and Current

Let:

n = number of free electrons
A = area
vd = drift velocity

Current:

$$I = nqAv_d$$

Hence,

$$v_d = \frac{I}{nqA}$$

Q25. Young's Double Slit Experiment

Principle:

Interference of light waves.

Fringe width:

$$\beta = \frac{\lambda D}{d}$$

Where
λ = wavelength
D = distance of screen
d = slit separation

Q26. Faraday's Laws

First Law:

Induced emf is produced when magnetic flux changes.

Second Law:

$$E = -\frac{d\Phi}{dt}$$

Negative sign indicates Lenz's law.

Q27. Energy Stored in Capacitor

Work done:

$$W = \frac{1}{2}CV^2$$

Energy stored:

$$U = \frac{1}{2}CV^2$$

Q28. Bohr's Model

Postulates:

1. Electrons revolve in fixed orbits.

2. Angular momentum is quantized:

$$mvr = \frac{nh}{2\pi}$$

Energy of nth orbit:

$$E_n = -\frac{13.6}{n^2}eV$$

SECTION D

Q29. Photoelectric Effect

(a) Threshold frequency: Minimum frequency required for emission.

(b) Increasing intensity increases number of electrons.

(c) Einstein's equation:

$$h\nu = KE_{max} + \Phi$$

(d) If frequency < threshold → No emission.

Q30. Transformer

(a) Step-down transformer

(b) $\frac{V_s}{V_p} = \frac{N_s}{N_p}$

(c) Laminated core reduces eddy current loss.

(d) Efficiency:

$$\eta = \frac{Output}{Input} \times 100$$

SECTION E

Q31. Magnetic Field on Axis of Circular Loop

$$B = \frac{\mu_0 I R^2}{2(R^2 + x^2)^{3/2}}$$

At centre (x=0):

$$B = \frac{\mu_0 I}{2R}$$

Q32. Cyclotron

Principle:

Charged particle moves in circular path in magnetic field.

Time period:

$$T = \frac{2\pi m}{qB}$$

It accelerates particles using electric field.

Q33. Fringe Width in YDSE

Path difference:

$$\Delta x = \frac{d}{D}y$$

For bright fringe:

$$y = \frac{\lambda D}{d}$$

Fringe width:

$$\beta = \frac{\lambda D}{d}$$