CLASS XII – PHYSICS

ANSWER KEY

(SET- 5)

SECTION A

MCQ Answers

1. (c) $1/r^3$
2. (b) Increases
3. (a) BIL
4. (d) Volt
5. (b) Power factor = 1
6. (b) Wavelength decreases
7. (a) Joule
8. (c) $A^{1/3}$
9. (a) Uniform
10. (c) Turns ratio
11. (b) Maximum
12. (c) Nuclear force

Assertion–Reason Answers

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

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

SECTION B

Q17. Gauss's Law

Statement:

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

Mathematical Form:

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

Q18. Resistivity

Definition:

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

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

SI Unit: Ohm-meter (Ωm)

Q19. Electromagnetic Induction

It is the phenomenon of production of induced emf when magnetic flux linked with a circuit changes.

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

Q20. Diffraction of Light

Diffraction is the bending of light waves around the edges of an obstacle.

Q21. Radioactive Decay Constant

Decay constant (λ) is the probability of decay per unit time.

$$\lambda = \frac{-1}{N}\frac{dN}{dt}$$

SECTION C

Q22. Potential Energy of Electric Dipole

Potential energy:

$$U = -pE\cos\ \theta$$

Where
p = dipole moment
E = electric field

Q23. Equivalent Resistance

Series Combination:

$$R_s = R_1 + R_2 + R_3$$

Parallel Combination:

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

Q24. Magnetic Field Inside Long Solenoid

Using Ampere's Law:

$$B = \mu_0 nI$$

Where
n = number of turns per unit length

Q25. Compound Microscope

Magnifying Power:

$$M = \frac{L}{f_o}\left(1+\frac{D}{f_e}\right)$$

Q26. Average Power in AC Circuit

$$P = VI\cos\ \phi$$

Where
$\cos\phi$= power factor

Q27. Photoelectric Effect

Laws:

1. Emission occurs only if frequency ≥ threshold frequency.
2. KE depends on frequency.
3. Current depends on intensity.
4. Emission is instantaneous.

Einstein's equation:

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

Q28. Nuclear Fission

Heavy nucleus splits into lighter nuclei with release of energy.

Chain reaction:
Self-sustaining fission reaction.

SECTION D

Q29. Electric Dipole

(a) Dipole moment:

$$p = q \times d$$

(b) Torque:

$$\tau = pE\sin\ \theta$$

(c) Stable equilibrium when θ = 0°

(d) At 90°:

$$U = 0$$

Q30. Radioactivity

(a) Half-life: Time for half nuclei to decay.

(b)

$$T_{1/2} = \frac{0.693}{\lambda}$$

(c) Activity:

$$A = \lambda N$$

(d) Activity decreases with time.

SECTION E

Q31. Gauss's Law and Electric Field Due to Infinite Plane Sheet

Using Gaussian surface:

$$E = \frac{\sigma}{2\varepsilon_0}$$

Q32. Transformer

Principle:

Electromagnetic induction

Voltage ratio:

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

EMF equation:

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

Q33. de-Broglie Wavelength

$$\lambda = \frac{h}{p}$$

For electron:

$$\lambda = \frac{h}{mv}$$

Significance:

- Explains wave nature of matter
- Basis of electron diffraction
