

CLASS XII – PHYSICS
MODEL QUESTION PAPER
(SET – 10)

Time Allowed: 3 Hours

Maximum Marks: 70

General Instructions:

1. All questions are compulsory.
 2. Use of calculator is not permitted.
 3. Draw neat and properly labelled diagrams wherever required.
 4. Internal choices are provided wherever applicable.
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Question Paper Design

- **Total Questions:** 33
 - **Section A:** 16 Questions (12 MCQs + 4 Assertion–Reason) $\times 1 = 16$
 - **Section B:** 5 Questions $\times 2 = 10$
 - **Section C:** 7 Questions $\times 3 = 21$
 - **Section D:** 2 Case Study Based $\times 4 = 8$
 - **Section E:** 3 Questions $\times 5 = 15$
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SECTION A (1 \times 16 = 16 Marks)

Q1–Q12: Multiple Choice Questions

1. Electric field due to dipole at large distance varies as:
(a) $1/r$
(b) $1/r^2$

- (c) $1/r^3$
 - (d) r
2. If plate area of capacitor is doubled, capacitance becomes:
- (a) Half
 - (b) Double
 - (c) Four times
 - (d) Same
3. The magnetic force on charge moving perpendicular to magnetic field is:
- (a) qvB
 - (b) qB/v
 - (c) vB/q
 - (d) qv/B
4. Faraday's law states that induced emf is proportional to:
- (a) Flux
 - (b) Rate of change of flux
 - (c) Current
 - (d) Resistance
5. In series LCR circuit at resonance, impedance is:
- (a) Maximum
 - (b) Minimum
 - (c) Infinite
 - (d) Zero
6. Fringe width in YDSE is proportional to:
- (a) Slit separation
 - (b) Wavelength
 - (c) $1/\text{Wavelength}$
 - (d) $1/\text{Screen distance}$
7. If frequency of light increases, stopping potential:
- (a) Decreases
 - (b) Increases
 - (c) Zero
 - (d) Constant
8. Binding energy per nucleon is highest for:
- (a) Helium
 - (b) Carbon
 - (c) Iron
 - (d) Uranium

9. The energy stored in capacitor is:
(a) $\frac{1}{2} CV^2$
(b) CV
(c) CV^2
(d) $\frac{1}{2} C^2V$
10. The time period of AC supply of frequency 50 Hz is:
(a) 0.01 s
(b) 0.02 s
(c) 0.05 s
(d) 0.1 s
11. The de-Broglie wavelength is inversely proportional to:
(a) Velocity
(b) Momentum
(c) Charge
(d) Energy
12. Nuclear radius varies as:
(a) A
(b) A^2
(c) $A^{1/3}$
(d) $1/A$
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Q13–Q16: Assertion–Reason Type

13.

Assertion (A): Electric field at surface of conductor is normal to surface.

Reason (R): Tangential component of electric field is zero.

14.

Assertion (A): In capacitive circuit, current leads voltage.

Reason (R): Capacitor opposes change in voltage.

15.

Assertion (A): Increasing temperature increases resistance of metal.

Reason (R): Collision of electrons increases.

16.

Assertion (A): Light shows dual nature.

Reason (R): It exhibits both interference and photoelectric effect.

SECTION B (2 × 5 = 10 Marks)

17. Define electric potential and write its unit.
18. State and explain Lenz's law.
19. Define reactance.
20. What is resolving power of telescope?
21. Define half-life of radioactive substance.

SECTION C (3 × 7 = 21 Marks)

22. Derive expression for electric field due to uniformly charged infinite plane sheet using Gauss's law.
23. Derive expression for charging of capacitor through resistor.
24. Derive expression for magnetic field at centre of circular coil.
25. Explain Young's double slit experiment and derive expression for fringe width.
26. Derive expression for average power in AC circuit.
27. Explain Bohr's postulates and derive radius of nth orbit.
28. Derive expression for radioactive decay law and half-life.

SECTION D (Case Study Based) (4 × 2 = 8 Marks)

29. Case Study: LCR Circuit

A series LCR circuit is connected to AC supply.

- (a) Define resonance.
- (b) Write expression for resonant frequency.
- (c) What is phase difference at resonance?
- (d) What happens to current at resonance?

30. Case Study: Nuclear Reactor

A nuclear reactor uses uranium fuel.

- (a) Define nuclear fission.
 - (b) What is chain reaction?
 - (c) Role of moderator.
 - (d) Why shielding is necessary?
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SECTION E (5 × 3 = 15 Marks)

- 31. Derive expression for electric potential due to point charge.
- 32. Explain construction and working of transformer with diagram and derive voltage ratio formula.
- 33. Derive Einstein's photoelectric equation and explain its significance.