CLASS XII – PHYSICS

MODEL QUESTION PAPER

(SET – 6)

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 labelled diagrams wherever required.
4. Internal choices are provided in some questions.

Question Paper Design

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

SECTION A (1 × 16 = 16 Marks)

Q1–Q12: Multiple Choice Questions

1. Electric field due to uniformly charged spherical shell inside the shell is:
   (a) Maximum
   (b) Minimum

(c) Zero
(d) Infinite

2. The capacitance of a capacitor depends upon:
   (a) Shape of plates
   (b) Medium between plates
   (c) Distance between plates
   (d) All of these

3. The force on a charge moving parallel to magnetic field is:
   (a) Maximum
   (b) Minimum
   (c) Zero
   (d) Infinite

4. The SI unit of magnetic flux is:
   (a) Tesla
   (b) Weber
   (c) Henry
   (d) Volt

5. In AC circuit with only resistor, phase difference between V and I is:
   (a) 90°
   (b) 0°
   (c) 45°
   (d) 180°

6. The wavelength of X-rays is of the order of:
   (a) 10^{-2} m
   (b) 10^{-6} m
   (c) 10^{-10} m
   (d) 10^{-3} m

7. The work done in rotating dipole by 180° in electric field is:
   (a) pE
   (b) 2pE
   (c) pE/2
   (d) Zero

8. The energy of photon increases when:
   (a) Frequency decreases
   (b) Frequency increases
   (c) Wavelength increases
   (d) Speed decreases

9. The number of turns in secondary coil of step-up transformer is:
   (a) Less than primary
   (b) Equal to primary
   (c) More than primary
   (d) Zero

10. The dimensional formula of magnetic field is:
   (a) $[MT^{-2}A^{-1}]$
   (b) $[MLT^{-2}A^{-1}]$
   (c) $[M^1L^0T^{-2}A^{-1}]$
   (d) $[M^0LT^{-2}A^{-1}]$

11. Binding energy per nucleon is least for:
   (a) Iron
   (b) Helium
   (c) Uranium
   (d) Carbon

12. The critical angle depends upon:
   (a) Nature of medium
   (b) Wavelength
   (c) Temperature
   (d) Pressure

Q13–Q16: Assertion–Reason Type

13.

Assertion (A): Electric lines of force originate from positive charge.
Reason (R): Positive charge is source of electric field.

14.

Assertion (A): Induced current opposes the cause producing it.
Reason (R): It is consequence of Lenz's law.

15.

Assertion (A): Increasing slit separation decreases fringe width.
Reason (R): Fringe width is directly proportional to slit separation.

16.

Assertion (A): Mass defect accounts for nuclear energy.
Reason (R): Δm is converted into energy according to $E = mc^2$.

SECTION B (2 × 5 = 10 Marks)

17. Define electric flux and write its expression.
18. What is Wheatstone bridge?
19. Define self-induction.
20. State laws of photoelectric emission.
21. Define nuclear binding energy.

SECTION C (3 × 7 = 21 Marks)

22. Derive expression for electric field due to uniformly charged solid sphere.
23. Derive expression for resistance of a conductor.
24. Derive expression for magnetic field due to infinite straight wire using Ampere's law.
25. Explain interference in thin films.
26. Derive expression for average power in LCR circuit.
27. Derive expression for Bohr's energy levels.
28. Explain radioactive decay and derive half-life formula.

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

29. Case Study: Transformer

A transformer converts 220V AC to 11V AC.

(a) Identify type of transformer.
(b) Write turns ratio formula.
(c) Why soft iron core is used?
(d) Define efficiency.

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30. Case Study: Photoelectric Effect

Light of different frequencies is incident on metal surface.

(a) Define threshold frequency.
(b) Effect of intensity on current.
(c) Write Einstein’s equation.
(d) Define stopping potential.

SECTION E (5 × 3 = 15 Marks)

31. Derive expression for electric field due to electric dipole on equatorial line.

32. Explain construction and working of AC generator with labelled diagram.

33. Derive relation between decay constant and mean life.