CLASS XII – PHYSICS

MODEL QUESTION PAPER

(SET – 8)

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 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. The electric flux through a closed surface depends on:
    (a) Shape of surface
    (b) Area of surface
    (c) Charge enclosed
    (d) Electric field outside

2. If length of conductor is doubled, resistance becomes:
   (a) Half
   (b) Double
   (c) Four times
   (d) Same

3. Magnetic field at centre of circular loop increases when:
   (a) Radius increases
   (b) Current increases
   (c) Turns decrease
   (d) Radius doubles

4. The direction of induced current is given by:
   (a) Fleming's left hand rule
   (b) Right hand thumb rule
   (c) Lenz's law
   (d) Ampere's law

5. In purely inductive circuit, current:
   (a) Leads voltage
   (b) Lags voltage
   (c) In phase
   (d) Zero

6. The phenomenon responsible for rainbow formation is:
   (a) Reflection
   (b) Refraction
   (c) Dispersion
   (d) Interference

7. The stopping potential is directly related to:
   (a) Intensity
   (b) Frequency
   (c) Area
   (d) Temperature

8. The most stable nucleus is around mass number:
   (a) 20
   (b) 40
   (c) 56
   (d) 200

9. The energy stored in magnetic field of inductor is:
   (a) ½ LI

(b) $\frac{1}{2} LI^2$

(c) LI^2

(d) $L^2 I$

10. The relation between wavelength and momentum is given by:

(a) $\lambda = h/p$

(b) $\lambda = hp$

(c) $\lambda = h/p^2$

(d) $\lambda = p/h$

11. The critical angle increases when:

(a) Refractive index decreases

(b) Refractive index increases

(c) Temperature decreases

(d) Frequency decreases

12. The work done in moving charge between two points on same equipotential surface is:

(a) Maximum

(b) Minimum

(c) Zero

(d) Infinite

Q13–Q16: Assertion–Reason Type

13.

Assertion (A): Electric field inside conductor is zero.
Reason (R): Free charges rearrange to cancel internal field.

14.

Assertion (A): Current in inductive circuit lags voltage.
Reason (R): Inductor stores energy in magnetic field.

15.

Assertion (A): Increasing frequency increases kinetic energy of electrons.
Reason (R): $KE = h\nu - \Phi$.

16.

Assertion (A): Nuclear forces are stronger than electrostatic forces inside nucleus.
Reason (R): They act at very short range.

SECTION B (2 × 5 = 10 Marks)

17. Define electric dipole and dipole moment.

18. State Ohm's law.

19. Define mutual induction.

20. What is resolving power of microscope?

21. Define radioactive activity.

SECTION C (3 × 7 = 21 Marks)

22. Derive expression for electric field due to infinite line charge using Gauss's law.

23. Derive expression for equivalent capacitance in parallel combination.

24. Derive expression for magnetic field at axial point of circular coil.

25. Explain Young's double slit experiment and derive fringe width formula.

26. Derive expression for time period of LC circuit.

27. Explain photoelectric effect and its experimental observations.

28. Explain nuclear binding energy curve and its significance.

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

29. Case Study: LCR Circuit

An AC source is connected to series LCR circuit.

(a) Define resonance frequency.
(b) Write impedance formula.
(c) What is power factor at resonance?
(d) What happens to current at resonance?

30. Case Study: Electromagnetic Waves

EM waves travel through space.

(a) What are transverse waves?
(b) Write relation between E and B fields.

(c) Define frequency.

(d) Write speed formula of EM waves.

SECTION E (5 × 3 = 15 Marks)

31. Derive expression for potential due to electric dipole on axial line.

32. Explain construction and working of transformer and derive voltage ratio formula.

33. Derive expression for half-life of radioactive substance.