CLASS XII – PHYSICS

MODEL QUESTION PAPER

(SET – 7)

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. Electric potential inside a charged spherical conductor is:
   (a) Zero
   (b) Constant
   (c) Maximum
   (d) Infinite

2. The energy density of electric field is proportional to:
   (a) E
   (b) E^2
   (c) $1/E$
   (d) $\sqrt{E}$

3. The direction of magnetic field around straight conductor is given by:
   (a) Fleming's left hand rule
   (b) Fleming's right hand rule
   (c) Right hand thumb rule
   (d) Lenz's law

4. The induced emf is negative sign because of:
   (a) Gauss's law
   (b) Faraday's law
   (c) Lenz's law
   (d) Ampere's law

5. In LCR circuit at resonance, power factor is:
   (a) 0
   (b) 1
   (c) ½
   (d) ∞

6. The magnifying power of telescope is independent of:
   (a) Focal length of objective
   (b) Focal length of eyepiece
   (c) Length of tube
   (d) Diameter of lens

7. The kinetic energy of emitted electrons depends on:
   (a) Intensity
   (b) Frequency
   (c) Area
   (d) Metal thickness

8. Nuclear forces are:
   (a) Long range
   (b) Short range
   (c) Infinite range
   (d) Weak

9. The time period of LC oscillations increases when:
   (a) L increases

(b) C decreases

(c) Both L and C decrease

(d) L decreases

10. The refractive index of vacuum is:

(a) 0

(b) 1

(c) 1.5

(d) Infinite

11. The electric field lines are perpendicular to:

(a) Electric field

(b) Equipotential surface

(c) Magnetic field

(d) Force

12. The activity of radioactive sample depends on:

(a) Number of nuclei

(b) Temperature

(c) Pressure

(d) Volume

Q13–Q16: Assertion–Reason Type

13.

Assertion (A): Electric field inside cavity of conductor is zero.
Reason (R): Conductor in electrostatic equilibrium has no net field inside.

14.

Assertion (A): Current leads voltage in capacitive circuit.
Reason (R): Capacitor resists change in voltage.

15.

Assertion (A): Shorter wavelength has higher resolving power.
Reason (R): Resolving power is inversely proportional to wavelength.

16.

Assertion (A): Fusion takes place at high temperature.
Reason (R): High temperature overcomes electrostatic repulsion.

SECTION B (2 × 5 = 10 Marks)

17. Define electrostatic potential energy.

18. What is motional emf?

19. Define inductive reactance.

20. State Huygens' principle.

21. What is mass defect?

SECTION C (3 × 7 = 21 Marks)

22. Derive expression for torque on electric dipole in uniform electric field.

23. Explain meter bridge and write its working principle.

24. Derive expression for magnetic field due to solenoid.

25. Explain diffraction and state conditions for maxima.

26. Derive expression for impedance of series LCR circuit.

27. Explain dual nature of matter and derive de-Broglie equation.

28. Derive relation between half-life and decay constant.

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

29. Case Study: Electric Field

A point charge is placed in vacuum.

(a) Write expression for electric field.
(b) Define electric flux.
(c) What is direction of field lines?
(d) State Gauss's law.

30. Case Study: Nuclear Fission

Uranium nucleus undergoes fission.

(a) Define nuclear fission.
(b) What is chain reaction?

(c) Role of moderator.
(d) Why control rods are used?

SECTION E (5 × 3 = 15 Marks)

31. Derive expression for capacitance of spherical capacitor.

32. Explain construction and working of moving coil galvanometer and derive torque expression.

33. Derive Einstein's photoelectric equation and explain its graphical interpretation.