CLASS XII – PHYSICS

MODEL QUESTION PAPER

(SET – 9)

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 field due to point charge varies as:
   (a) r
   (b) 1/r

(c) $1/r^2$

(d) r^2

2. The capacitance of a parallel plate capacitor is inversely proportional to:
   (a) Area
   (b) Dielectric constant
   (c) Plate separation
   (d) Charge

3. The force between two parallel current carrying wires is attractive when currents are:
   (a) Opposite
   (b) Same direction
   (c) Zero
   (d) Alternating

4. The induced emf in a coil is maximum when:
   (a) Flux is constant
   (b) Flux changes rapidly
   (c) Area is zero
   (d) Current is zero

5. In purely capacitive AC circuit, current:
   (a) Leads voltage by 90°
   (b) Lags voltage by 90°
   (c) In phase
   (d) Zero

6. The interference pattern in YDSE disappears when:
   (a) Slits are coherent
   (b) Slits are very close
   (c) Slits are illuminated by white light only
   (d) Slits are not coherent

7. The energy of photon is given by:
   (a) $E = mc^2$
   (b) $E = hv$
   (c) $E = hv^2$
   (d) $E = \frac{1}{2}mv^2$

8. The nuclear force is independent of:
   (a) Charge
   (b) Distance

(c) Mass

(d) Temperature

9. The magnetic flux through surface is maximum when angle between field and area vector is:

   (a) 0°

   (b) 30°

   (c) 60°

   (d) 90°

10. The half-life of radioactive element is:

    (a) Time for decay of half nuclei

    (b) Time for complete decay

    (c) Time for doubling nuclei

    (d) Time for emission of one particle

11. The quality factor of LCR circuit is high when resistance is:

    (a) High

    (b) Low

    (c) Infinite

    (d) Zero

12. Bohr's angular momentum is quantized as:

    (a) $nh/2\pi$

    (b) $h/2\pi$

    (c) nh

    (d) h

Q13–Q16: Assertion–Reason Type

13.

Assertion (A): Electric field lines are perpendicular to conductor surface.
Reason (R): Tangential component of electric field is zero.

14.

Assertion (A): Induced emf opposes change in flux.
Reason (R): It obeys conservation of energy.

15.

Assertion (A): Shorter wavelength improves resolution.
Reason (R): Resolving power is directly proportional to wavelength.

16.

Assertion (A): Heavy nuclei undergo fission easily.

Reason (R): Binding energy per nucleon decreases for heavy nuclei.

SECTION B (2 × 5 = 10 Marks)

17. Define electric field intensity and write its SI unit.

18. Define magnetic dipole moment.

19. What is impedance?

20. Define total internal reflection and write condition.

21. Define decay constant.

SECTION C (3 × 7 = 21 Marks)

22. Derive expression for electric potential due to electric dipole.

23. Derive expression for energy stored in capacitor.

24. Derive expression for force on current carrying conductor in magnetic field.

25. Explain diffraction due to single slit.

26. Derive expression for average power in AC circuit.

27. Explain Bohr's model and derive energy of nth orbit.

28. Derive radioactive decay law.

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

29. Case Study: Transformer

A transformer is used in power transmission.

(a) Define step-up transformer.
(b) Write voltage ratio formula.
(c) Why laminated core is used?
(d) What is efficiency?

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30. Case Study: Photoelectric Effect

Light of frequency greater than threshold frequency is incident.

(a) Define threshold frequency.
(b) What happens if intensity increases?
(c) Write Einstein's equation.
(d) Define stopping potential.

SECTION E (5 × 3 = 15 Marks)

31. Derive expression for electric field due to infinite plane sheet using Gauss's law.

32. Explain construction and working of cyclotron with diagram.

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