CODE : A-P616123-A	**I Semester Exam 2025-26**	3 X 570
Std. : XII	Sub. : PHYSICS	Marks : 70
Date :	Roll No. _____	Time : 3 hrs.

Section - A

Q. 1 **Select and write correct answer.** 10

i) The moment of inertia of a body does not depend on
   a) mass of body.
   b) angular velocity of body
   c) axis of rotation of body.
   d) distribution of mass in body

ii) The displacement of particle performing linear harmonic. motion in one time period is
   a) A c) zero
   b) 2A d) 4A

iii) The distance between two nodes in a stationary wave of wavelength is
   a) λ c) $\lambda / 2$
   b) $\lambda / 4$ d) 2λ

iv) The centre of interference pattern is
   a) always bright c) may be bright or dark
   b) always dark d) brightness changes continuously

v) Kirchhoff's voltage law is conservation of
   a) charge c) momentum
   b) energy d) potential

vi) Cyclotron can not accelerate
   a) protons c) deuterons
   b) α - particles d) neurons

vii) Which of the following material is repelled by an external magnetic field ?
   a) copper c) cobalt
   b) iron d) steel

viii) Photoelectric effect is emission of
   a) protons c) photons
   b) electrons d) neutrons

ix) Four resistances 10 Ω , 10 Ω and 15 Ω form a wheatstone's network,. What shunt is required across 15 Ω resistor to balance the bridge.
   a) 10 Ω c) 30 Ω
   b) 20 Ω d) 15 Ω

x) Moment of inertia of a disc about its own axis is I. Its moment of inertia about a tangential axis in its plane is
   a) 3 I c) 2 I
   b) $\frac{3}{2}$ I d) $\frac{5}{2}$ I

Q. 2 **Attempt the following questions.** **8**

i) For a system of particles, when is the angular momentum conserved ?

ii) Write the differential equation for linear SHM.

iii) State law of length of vibrating string.

iv) Define plane polarized light.

v) What is the disadvantage of potentiometer.

vi) What is photocell.

vii) Magnetic susceptibility (x) = 198, find relative permeability (μ_r).

viii) Calculate value of magnetic field at distance of 2 cm from a very long straight wire carrying current of 1 A. (Given : $\mu_0 = 4\pi \times 10^{-7}$ wb / Am)

Section - B

Attempt any EIGHT questions of the following : **16**

Q. 3 Explain concept of centrifugal force.

Q. 4 Draw the graph to explain variation of KE, PE and TE with displacement.

Q. 5 Distinguish between free vibration and forced vibrations.

Q. 6 State the condition to get constructive and destructive interference of light.

Q. 7 Derive cyclotron formula.

Q. 8 Obtain an expression for orbital magnetic moment of an electron rotating about nucleus in an atom.

Q. 9 Define : i) Threshold frequency
ii) Photoelectric work function

Q. 10 A flat curve on highway has a radius of curvature 400 m. A car goes around a curve at a speed of 32 m/s. What is minimum value of coefficient of friction that will prevent the car from sliding ? ($g = 9.8$ m/s^2)

Q. 11 The maximum velocity of a particle performing SHM is 6.28 cm/s. If length of its path is 8 cm, calculate its period.

Q. 12 A solenoid of length π m and 5 cm in diameter has winding of 1000 turns and carries a current of 5 A. Calculate the magnetic field at its centre along the axis.

Q. 13 Find magnetization of a bar magnet of length 10 cm and cross sectional area 4 cm^2, if the magnetic moment is 2 Am^2.

Q. 14 When two cells of emfs E_1 and E_2 are connected in series so as to assist each other, their balancing length on potentiometer is found to be 2.7 m. When the cells are connected in series so as to oppose each other the balancing length is found to be 0.3 m. Compare emfs of two cells.

Section - C

Attempt any EIGHT questions of the following. **24**

Q. 15 Derive expression for time period of a conical pendulum.

Q. 16 Obtain an expression for velocity of a particle performing linear SHM.

Q. 17 Derive an expression for equation of sationary wave on a stretched string.

Q. 18 What is Brewster's law ? Derive formula for Brewster angle.

Q. 19 Explain with the help of formula how moving coil galvanometer can be converted into a volt meter.

Q. 20 Explain ferromagnetism on the basis of domain theory.

Q. 21 Explain in brief the effect of potential difference on photo electric current at constant frequency of incident radiation.

Q. 22 The equation of transverse wave along a stretched string is given by

$y = 2 \sin \pi \left[\frac{t}{0.02} - \frac{x}{40} \right]$, where the length is expressed in cm and time in second.

Calculate the wavelength, frequency and velocity of wave.

Q. 23 In Youngs experiment, ratio of intensity at the maxima and minima in interference pattern is 36 : 9. What will be ratio of intensities of two interfering waves.

Q. 24 The resistance of a potentiometer wire is 8 Ω and its length is 8 m. A resistance box and a 2V battery are connected in series with it. What should be resistance in the box if it is desired to have potential drop of 1 μv /mm ?

Q. 25 Derive expression for force per unit length between two long current carrying parallel wire separated by small distance.

Q. 26 An electron is accelerated through potential of 120 volt. Find its de Broglie wavelength.

Section - D

Attempt any THREE of the following. **12**

Q. 27 State and prove the principle of parallel axes in rotational motion.

Q. 28 Show that only odd harmonics are present in the vibration of air column in a pipe closed at one end.

Q. 29 Define : i) Amplitude of SHM
ii) Period of SHM

A particle performing linear SHM has maximum velocity of 25 cm/s and maximum acceleration of 100 cm/s^2. Find period of oscillation.

Q. 30 Distinguish between Interference and Diffraction. (Any two points)
A point is situated at 7 cm and 7.2 cm from two coherent sources. Find nature of illumination at point if wavelength of light is 4000 A°.

Q. 31 State Ampere's law with mathematical formula.
What is the magnitude of magnetic force per unit length on wire carrying a current of 8 A and making an angle of 30° with direction of uniform magnetic field of 0.15 T ?