Code: A-P 730113-A	**I SEMESTER EXAM. - 2023-24**	3 x 820
Std.: XI	Sub: PHYSICS	Marks: 50
Date: 06/11/23	Roll No.: _____	Time: 2½ hrs.

SECTION - A

Q1] Select and write correct answer for the following multiple choice type questions. 7

(i) Which of the following is not a fundamental unit?

(A) cm (B) kg

(C) centigrade (D) volt

(ii) $[L^1M^1T^2]$ is the dimensional formula for

(A) velocity (B) acceleration

(C) force (D) work

(iii) If $\hat{n}$ is the unit vector in the direction of A then,

(A) $\hat{n} = \bar{A} / |\bar{A}|$ (B) $\hat{n} = \bar{A} \ |\bar{A}|$

(C) $\hat{n} = \bar{A} / |A|$ (D) $\hat{n} = \hat{n} \times \bar{A}$

(iv) The resultant of two forces of 3 N and 4 N is 5 N, the angle between the forces is

(A) 30° (B) 60°

(C) 90° (D)120°

(v) For a particle having a uniform circular motion, which of the following is constant

(A) Speed (B) Velocity

(C) Acceleration (D) Displacement

(vi) In case of elastic collision, which is true?

(A) Momentum and K.E. is conserved.

(B) Momentum conserved and K.E. not conserved.

(C) Momentum not conserved and K.E. conserved

(D) Momentum and K.E. both not conserved.

(vii) The geometric length of a bar magnet having half magnetic length 5 cm is

(A) 12 (B) 10

(C) 6 (D) 4.2

Q2] Answer in one Sentence. 7

(i) Define mean absolute error,

(ii) State the order of magnitude of electron of mass 9.1×10^{-31} kg.

(iii) Explain unit vector.

(iv) Find $\bar{P}.\bar{Q}$ *where* $\bar{P} = 2\hat{i} + \hat{j} + \hat{k}$ *and* $\bar{Q} = \hat{i} - \hat{j} + 2\hat{k}$

(v) A man throws a ball to maximum horizontal distance of 80 m. Calculate the maximum height reached.

(vi) A bar magnet of magnetic moment 5.0 Am^2 has the poles 20cm apart. Calculate the pole strength

(vii) Write the C.G.S unit for force.

SECTION-B

Attempt Any Eight **16**

Q3) If the formula for a physical quantity is $X = a^4b^3 / c^{1/3} d^{1/2}$ and if the percentage error in the measurements of a, b, c and d are 2%, 3%, 3% and 4% respectively. Calculate percentage error in X.

Q4) State the limitations of dimensional analysis.

Q5) Find the scalar product of the two vectors $\vec{V_1} = \hat{i} + 2\hat{j} + 3\hat{k}$ *and* $\vec{V_2} = 3\hat{i} + 4\hat{j} - 5\hat{k}$

Q6) A projectile is projected at an angle of 60°. If its time of flight is 16 sec, calculate its horizontal range

Q7) A short bar magnet has a dipole moment of 2 Am^2. Find the magnetic field at a point on its axis at a distance of 20 cm from its centre in air. [$\mu_0 / 4\pi = 10^{-7}$ Wb/Am]

Q8) Obtain an expression for the horizontal range of a projectile.

Q9) Define coefficient of restitution. State its value in case of a elastic, perfectly elastic and perfectly inelastic collision.

Q10) State properties of magnetic lines of force.

Q11) Define magnetic flux. State its SI unit.

Q12) Define resolution of vectors and horizontal range of projectile

Q 13) What are dimensions of power ?

SECTION - C

Attempt any four **12**

Q14) Define dimensions and dimensional formula of physical quantities. Give two examples of dimensional formula,

Q15) State and prove parallelogram law of vector addition. Determine magnitude and direction of resultant vector.

Q16) Derive an expression for centripetal acceleration of a particle performing uniform circular motion.

Q17) Two small and similar bar magnets have magnetic dipole moment of 1.0 Am^2 each. They are kept in a plane in such a way that their axes are perpendicular to each other. A line drawn through the axis of one magnet passes through the centre of other magnet. If the distance between their centre is 2 m, find the magnitude of magnetic field at the midpoint of the line joining their centre.

Q18) In Ohm's experiments, the values of the unknown resistances. were found to be, 6.12 Ω, 6.09 Ω, 6.22 Ω, 6.15 Ω .Calculate the (mean) absolute error, relative error and percentage error in these measurements.

Q19) A body is projected with a velocity of 30 m/s at an angle of 30° with the vertical. Find the
(i) maximum, height (ii) time of flight (iii) the horizontal range

Section - D

Attempt any Two **8**

Q20) What is triangle law of vector addition?

Find 'a' if $\vec{A} = 3\hat{i} - 2\hat{j} + 4\hat{k}$ *and* $\vec{B} = a\hat{i} + 2\hat{j} - \hat{k}$ are perpendicular to one another.

Q21) What is a conical pendulum? Show that its time period is given by, $2\pi\sqrt{l\cos\theta/g}$ where l is the length of the string, θ is the angle that the string makes with the vertical and g is the acceleration due to gravity.

Q 22) Show that the magnitude of magnetic field at a point on the axis of a short bar magnet is twice the magnitude of magnetic field at a point on the equator at the same distance. A short bar magnet has a magnetic moment of 0.48 J/T. Give the direction and magnitude of the magnetic field produced by the magnet at a distance of 10 cm from the centre of the magnet on (i) the axis (ii) the equatorial lines (normal bisector) of the magnet.

Q 23) A bar magnet of magnetic moment 5.0 Am^2 has the poles 20 cm apart. Calculate the pole strength. Define the term magnetic equator and angle of dip.