

Q.1 Select and write the correct answer. (7 Marks)

- i) $[L^1M^1T^{-1}]$ is the dimensional formula of
 a) Force b) Energy c) Pressure d) Momentum
- ii) If m is the mass of a body and E its K.E., then its linear momentum is
 a) $m\sqrt{E}$ b) $2\sqrt{mE}$ c) $\sqrt{mE}$ d) $\sqrt{2mE}$
- iii) The magnitude of vector product of unit vector making an angle of 60° with each other is
 a) 1 b) 2 c) $3/2$ d) $\sqrt{3}/2$
- iv) The greatest height to which a man can throw a stone is h . The greatest distance to which he can throw it will be
 a) $h/2$ b) $2h$ c) h d) $3h$
- v) The number of significant figures in 11.118×10^6 is
 a) 3 b) 4 c) 5 d) 6
- vi) For an inelastic collision, the value of 'e' is _____
 a) greater than 1 b) less than 1 c) equal to 1 d) none of these
- vii) If $\hat{n}$ is the unit vector in the direction of $\vec{A}$ then,
 a) $\hat{n} = \vec{A}/A$ b) $\hat{n} = \vec{A}|\vec{A}|$ c) $\hat{n} = |\vec{A}|\vec{A}$ d) $\hat{n} = \hat{n} \times A$

Q. 2) Answer the following. (7 Marks)

- i) Define Dimensions
- ii) What is the dimension of power.
- iii) A particle moves in a circle with constant speed of 15m/s. The radius of the circle is 2m. Determine the centripetal acceleration of the particle.
- iv) Define the term couple.
- v) The error in measurement of the sides of a rectangle is 1%. What is the error in measurement of its area.
- vi) Define centre of mass of a body.
- vii) Define the term equal vector.

SECTION B**Attempt any EIGHT****(16 marks)**

- Q. 3 Define co-efficient of restitution and obtain its value for an elastic collision.
- Q. 4 Find the percentage error in kinetic energy of a body having mass (60.0 ± 0.39) moving with a velocity (25.0 ± 0.1) cm/s.
- Q. 5 Find the angle between the vectors
 $\vec{A} = \hat{i} + 2\hat{j} - \hat{k}$ and $\vec{B} = -\hat{i} + \hat{j} - 2\hat{k}$
- Q. 6 State the limitation of dimensional analysis.
- Q. 7 Discuss characteristic of scalar product of two vectors.
- Q. 8 A projectile is projected at an angle of 60° . If its time of flight is 16 sec. Calculate its horizontal range.

- Q. 9 Obtain an expression for maximum height of a projectile.
- Q. 10 Explain the terms inertial and non - inertial frame of reference.
- Q. 11 A force $\vec{F} = 3\hat{i} + \hat{j} - 4\hat{k}$ is applied at a point (3, 4, -2). Find its torque about the point (-1, 2, 4).
- Q. 12 Define and explain vector product of two vectors with suitable example.
- Q. 13 What is meant by order of magnitude Find the order of magnitude of height of tower 4325m.

SECTION C**Attempt any FOUR****(12 mark)**

- Q. 14 Find the area of a triangle formed by $\vec{A} = 3\hat{i} - 4\hat{j} + 2\hat{k}$ and $\vec{B} = \hat{i} + \hat{j} - 2\hat{k}$ as adjacent sides measure in meter.
- Q. 15 The radius of sphere measured repeatedly yields values 5.63 m, 5.54m, 5.44m, 5.40m and 5.35 m. Determine the most probable value of radius, the mean absolute, relative and percentage error.
- Q. 16 A body is thrown with a velocity of 49 m/s at an angle of 30° with the horizontal. Find - i) maximum height
ii) time of flight
iii) the horizontal range
- Q. 17 Two bodies undergo one-dimensional, perfectly inelastic, head-on collision. Derive an expression for their final velocity in terms of their masses and initial velocities.
- Q. 18 Obtain an expression for the time of flight of a projectile.
- Q. 19 Define resolution of vector. what is rectangular component of vectors ?

SECTION D**Attempt any TWO****(8 marks)**

- Q. 20 Distinguish between elastic and inelastic collision. write a note on electromagnetic (Em) force.
- Q. 21 Explain the use of dimensional analysis to check the correctness of physical equation $V = U + at$.
Find the conversion factor between S.I and C.G.S. units of work using dimensional and analysis.
- Q. 22 State and prove parallelogram law of vector addition. Determine magnitude and direction of resultant vector.
- Q. 23 State the formula for the range achieved by a projectile thrown from the origin with initial velocity u at an angle θ to the horizontal. For what angle is the horizontal range maximum. A projectile has a range of 50m and reaches a maximum height of 10m. what is the elevation of the projectile.
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