**B.Sc. DEGREE EXAMINATION, APRIL 2017.**

**III YEAR — V SEMESTER**

**Major Paper XI — DYNAMICS**

**Time : 3 hours Max. Marks : 75**

**SECTION A — (10 × 2 = 20 marks)**

**Answer any *TEN* questions.**

1. A particle has 2 velocities and and the resultant velocity is equal to in magnitude. Show that, when is doubled and remaining the same, the resultant is perpendicular to .
2. Define angular velocity.
3. Write the equations of motion of a particle under constant acceleration.
4. Define amplitude and period of a simple harmonic motion.
5. Find greatest height attained by a projectile.
6. Define the time of flight of a projectile.
7. Define impulsive force.
8. State the principle of conservation of linear momentum.
9. Define moment of inertia.
10. Write down the moment of inertia of a solid right circular cone about its axis.
11. Define direct impact.
12. What is the moment of inertia of a rectangular lamina of sides and about the line through the side of length ?

**SECTION B — (5 × 5 = 25 marks)**

**Answer any *FIVE* questions.**

1. Derive the three equations governing the rectilinear motion under constant acceleration.
2. A particle is moving with simple Harmonic motion and while moving from the mean position to one extreme position its distances at three consecutive seconds are . Then show that its period is .
3. A particle projected with a speed , strikes at right angles a plane through the point of projection inclined at an angle to the horizon. Show that being angle of projection.
4. A smooth sphere impinges directly on a fixed plane with a velocity . Find its velocity of rebound and the loss in its kinetic energy due to impact.
5. State and prove parallel axis theorem on moment of inertia.
6. Find the moment of inertia of a solid right circular cone about the line through the vertex perpendicular to the axis.
7. If a point moves in a straight line with uniform acceleration and covers successive equal distances in times , then show that .

[P.T.O.]

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions.**

1. Find the component of velocity and acceleration of a particle moving in a plane in the radial and transverse directions.
2. Discuss the composition of two simple Harmonic motions in the same period is again a Simple Harmonic Motion.
3. Prove that the path of a projectile is a parabola.
4. Find the loss in kinetic energy due to direct impact of two smooth spheres.
5. State and prove perpendicular axis theorem.

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