**B.Sc. DEGREE EXAMINATION, APRIL 2016.**

**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. Find the magnitude of the resultant velocity of a particle acted on by two forces with velocities and .
2. Define Relative angular velocity.
3. Define rectilinear motion.
4. State the general solution of the Simple Harmonic motion equation.
5. In a projectile prove that *K.E + P.E =* constant.
6. A stone is thrown with a velocity of at to the horizontal. Find its initial vertical velocity.
7. Define impulsive force and Impulse.
8. Define oblique impact of two bodies.
9. State perpendicular axis theorem.
10. What is the moment of inertia of a solid right circular cylinder ?
11. Define horizontal range and time of flight of a projectile.
12. Define moment of inertia of a particle of mass about a line.

**SECTION B — (5 × 5 = 25 marks)**

**Answer any *FIVE* questions.**

1. Find the components of the velocity of a particle in the tangential and normal directions.
2. In a Simple Harmonic Motion , express (a)  in  (b)  in  (c) in .
3. A particle projected at an angle with a velocity and it strikes up an inclined plane of inclination  at right angles to the plane. Prove that

(a) 

(b) 

1. A ballimpinges directly on an exactly equal and similar balllying on a horizontal plane. If the coefficient of restitution is , prove that after impact , the velocity of will be to that of is .
2. Find the moment of inertia of a hollow sphere of radius about an diameter.
3. A body of mass  is split into two parts of masses  by an internal explosion which generates a kinetic energy . Show that , if after explosion the parts move in the same line as before , their relative speed is 
4. State and prove the parallel axis theorem on moment of inertia.

[P.T.O.]

**SECTION C — (3 × 10 = 30 marks)**

**Answer any *THREE* questions.**

1. A particle move along a straight line with a constant acceleration .

Then to show that

1. 
2. 
3. .

Where  is the initial velocity of the particle , is the velocity of the particle at time and  is the distance of the particle at time  from a chosen fixed point on the line.

1. A particle is executing Simple Harmonic Motion with  mean position and  as the amplitude. When it is at a distancefrom , its velocity is quadrupled by a below. Show that its new amplitude is .
2. A particle is projected with velocity  making an angle with horizontal. Find the following :
3. Time of flight
4. The horizontal range
5. Time taken to attain the maximum height
6. The greatest height attained.
7. (a) A particle is projected from a point in a smooth fixed horizontal plane with velocity  at an elevation . Show that the particle ceases to rebound from the plane at the end of time  and that the total horizontal distance described in this period is  , where e is the coefficient of restitution.

(b) Show that the spans of successive rebounds a decreasing G.P as well as the maximum heights of the particle.

1. Find the moment of inertia of solid right circular cone about axis of the cone.

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