SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - V
20UMACT5011 - Dynamics

Total Duration : 2 Hrs 30 Mins. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Show that the angular velocity about a fixed point A of a particle P moving uniformly in a straight line, varies inversely as the square of the distance of the line from the fixed point.
2. A light elastic string of natural length 2a is stretched and is tied to two fixed points on a smooth horizontal table at a distance 4a apart. A particle of mass m is attached to its middle point and is displaced in the line of the string through the distance a and released. Find the period of oscillation and the maximum velocity acquired in the motion.
3. Determine the sum of Kinetic Energy and Potential Energy in a simple harmonic motion is a constant.
4. If the range on the horizontal plane of a projectile and the greatest height above the point of projection are R and H respectively then evaluate the velocity of the projection is $\sqrt{2gH + \frac{gR^2}{8H}}$.
5. When two equal balls of mass m are kept in contact on a table and the third equal ball strikes both symmetrically and remains at rest after impact then prove that e=2/3.
6. When two smooth sphere collide directly then determine the impulse imparted to each sphere and the change in the total kinetic energy of the sphere.
7. Show that the moment of inertia of a rectangular lamina of mass M and sides 2a and 2b about a diagonal is $M.\ \frac{2a^2b^2}{3(a^2+b^2)}$.
8. Evaluate the Moment of Inertia of the solid right circular cone about the line l.

Contd...

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Explain the components of the velocity and acceleration of a particle in the radial and transverse direction.
10. When a heavy particle of mass m is attached to one end of an elastic string of length l and co-efficient of elasticity $\frac{mg}{k}$ and the other end of the string is fixed at O and suppose the particle is allowed to fall from rest O, then show that the greatest speed of the particle is $\sqrt{gl(2+k)}$.
11. Justify that the path of a projectile is a parabola.
12. Discuss the velocities of two smooth spheres after a direct impact between them.
13. State and prove Perpendicular Axis Theorem.

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