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 APRIL-2023
SEMESTER - V
08UMACT5011 - Dynamics

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

Section B

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

1. The two ends of a train moving with constant acceleration pass a certain point with velocities u and v. Show that the velocity with which the middle point of the train passes the same point is $\sqrt{\frac{u^2+v^2}{2}}$.
2. The greatest range down on the inclined plane is 3 times the greatest range uo on the inclined plane. Such that plane is inclined at 30 to the horizontal.
3. A ball overtakes another ball of m times its mass, which is moving with $\frac{1}{n}$ th of its velocity in the same directions. If the impact reduces the first ball to rest, prove that the coefficient of elasticity is $\frac{m+n}{m(n-1)}$.
4. State and prove the parallel axis theorem.
5. Show that the resultant motion of two simple harmonic motion of same period along two perpendicular lines is along an ellipse.
6. Find the velocity of the projectile at any time t, the time of flight, the horizontal range, and maximum height attained by the projectile.
7. Find the velocities of two smooth spheres after a direct impact between them.
8. Find the moment of inertia of a triangular lamina.

Section C

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

9. The speed of a train increases at a constant rate α from O to V, and then remains constant for an interval and finally decreases to O at a constant rate β. If S is the total distance described prove that the total time T occupied is $T = \frac{s}{v} + \frac{v}{2}\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$.

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10. A particle executes a simple Harmonic motion has velocities v_1 and v_2 when its distances from the mean position O and d_1 and d_2 respectively. Find the amplitude, period and the velocity when its distance from O is $\frac{d_1 + d_2}{2}$.
11. Show that the path of a projectile is a parabola.
12. Obtain the differential equation of a central orbit in polar coordinates.
13. Find the Moment of inertia of elliptic lamina about its major axis.

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