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 EXAMINATION APRIL/NOV – 2021
SEMESTER - V

08UMACT5011 **&** UMA/CT/5011 **- Dynamics**

Total Duration	**: 3 Hrs**	**Total Marks**	**: 75**
MCQ	: 30 Mins	MCQ	: 15
Descriptive	: 2 Hrs.30 Mins	Descriptive	: 60

Section B

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

1. If a point moves in a straight line with uniform acceleration and covers successive equal distances in times $\boldsymbol{t_1, t_2, t_3}$, then show that,
   $\frac{1}{t_1} - \frac{1}{t_2} + \frac{1}{t_3} = \frac{3}{t_1+t_2+t_3}$.
2. Derive the scalar form of equation of motion of a particle executes simple harmonic motion.
3. Find the maximum range on an inclined plane of the projectile.
4. Two balls impinge directly and interchange their velocities after impact. Prove that, they are perfectly elastic and are of equal masses.
5. State and prove perpendicular axes theorem.
6. A particle is executing a simple harmonic motion of period T with O as the mean position. The particle passes through a point P with velocity V in the direction of OP. Show that, the time which lapses before its return to P is $\frac{T}{\pi} tan^{-1}\left(\frac{VT}{2\pi\ OP}\right)$.
7. A particle is projected from the point O on the ground with a velocity u inclined to the horizontal at an angle $\boldsymbol{\alpha}$. Find the horizontal range and time of flight of the projectile.
8. Find the moment of inertia of a solid sphere of radius ‘a’ about its diameter.

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Section C

Answer any ***THREE*** questions (3 × 10 = 30 Marks)

9. Find the components of velocity and acceleration of a particle in the radial and transverse direction.

10. Show that, the resultant motion of two simple harmonic motions of same period along two perpendicular lines, is along an ellipse.

11. Show that, the path of a projectile is a parabola.

12. Two smooth spheres of masses $m_1 \; and \; m_2$ impinges directly with velocities $v_1 \; and \; v_2$ respectively, find the velocities after impact and impulse imparted to each sphere due to impact.

13. Find the moment of inertia of an elliptic lamina of axes 2a, 2b about its major axis.