THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

MAT 333/3615 **Time: 3Hours**

MECHANICS-II **Max: 75 Marks**

ANSWER ANY FIVE QUESTIONS. **5X15=75**

1. Find the moment of inertia of the rectangular parallelepiped.
2. The velocities of a particle along and perpendicular to a radius vector from a fixed origin are λr^2 and $\mu\theta^2$ where μ and λ are constants. Show that the equation to the path of the particle is $\frac{\lambda}{\theta} + C = \frac{\mu}{2r^2}$ where C is a constant.
3. State and derive Pedal equation for central orbits.
4. State and Prove the Law of inverse squares.
5. A solid sphere of mass m rolls down a rough plane inclined to the horizon at an angle α. Find its acceleration.
6. Show that there are four points collinear with the center of gravity of a compound pendulum about which the periods are equal and that the length of the equivalent simple pendulum is the distance between the points un symmetrically situated with respect to the center of gravity.
7. Derive Hamilton's equations from D'Alembert's principle.