Assignment-01
Semester – 1st (Major)

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Marks: 05

1. While launching a rocket of mass 2×10^4 kg, a force of 5×10^5 N is applied for 20s. Calculate the velocity attained by the rocket at the end of 20s.

2. Motion of a particle is described by the equation

$$x = 4 \sin 2t$$
$$y = 4 \cos 2t$$
$$z = 6t$$

   Find the velocity and acceleration of the particle.

3. A particle of mass m moves along a curve given by

$$\vec{r} = 6t^2\,\hat{\imath} - 3t\hat{\jmath} + 5\hat{k}$$

   Calculate its angular momentum.

4. For a particle of mass m, position $\vec{r} = 12\hat{\imath} + 8\hat{\jmath}$ and velocity $\vec{v} = 6\hat{\imath}$, calculate its angular momentum about the origin.

5. During a baseball game, the pitcher throws the ball with a speed of 30 m/s. The mass of the ball is 0.15 kg. What is the kinetic energy of the ball when it leaves his hand? How much work has been done by his hand on the ball during the throw?