Year: 2023-24

Class: BSc (Hons.) Physics

Semester: I

Subject: Mechanics Assignment

Teacher: Dr. Bharti

Max. Marks. 12

Q 1 Find the moment of inertia of a uniform cube of side a about an axis passing through its center and parallel to one of the faces. **3 Marks**

Q 2. For an observer in an inertial frame S, a certain event takes place at $x_1 = -L/2$ and $t_1 = L/(2c)$. Another event takes place at $x_2 = L/2$ and $t_2 = L/(2c)$ so that for S the two events are simultaneous. Show that for another inertial observer S' moving along x-axis with velocity v, the events are not simultaneous and calculate the time interval between the two events. **3 marks**

Q 3. A particle of mass m moves under a conservative force with potential energy $V(x) = -(1/2)ax^2+(1/4)bx^4$, where a and b are positive constants. Find the position of stable equilibrium and the period of small oscillations about it. **3 marks**

Q 4. A bullet is fired straight up with initial speed v_o'. Assuming g is constant and ignoring air resistance, show that the bullet will hit the ground west of the initial point of upward motion by an amount$4\omega v_o'^3 \cos \lambda/3g^2$, where λ is the latitude and ω is Earth's angular velocity. **3 marks**