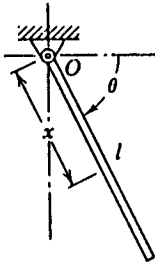


1. Explain the following terms: (15%)
 - a) Newton's three laws of motion,
 - b) natural frequency of vibration.
 - c) magnification factor for vibration.

2. Answer the following questions: (15%)
 - a) What is the relation among the Newton's second law of motion, the principle of work and energy and the principle of impulse and momentum?
 - b) Which kind of problems can not be solved by the principle of work and energy? Explain the reason.

3. Derive the coefficient of restitution for the central impact of two particles and explain what is elastic impact and what is plastic impact. (20%)

4. The uniform slender bar of mass m and length l is pivoted freely at its end about a horizontal axis through O and released from rest at $\theta=0$. For a given θ , find the maximum value of the bending moment M in the bar in terms of x and the value of θ at which it occurs. (25%)



5. A bar 600 mm long rolls on wheels of negligible mass on a circular path with a radius of 500 mm. Determine the frequency of oscillation for the bar if it moves in the vertical plane and is displaced slightly from its equilibrium position. (25%)

