



St Xavier's College Physics Club (SXCPC)

Maitighar, Kathmandu

Question Of the Month-August Series

A spring with an unknown force constant (k) is attached to a block of mass (m) on a frictionless surface. The block undergoes simple harmonic motion (SHM) when displaced from its equilibrium position.

Question:

1. Derive the equation of motion for the block undergoing simple harmonic motion, starting from Newton's second law. Express the angular velocity (ω) and the time period (T) in terms of the mass (m) and the force constant (k).
2. A student performs an experiment to determine the force constant of the spring. The block is displaced by 5 cm from the equilibrium position and released from rest. The student measures that the block completes 20 oscillations in 10 seconds. Calculate the force constant (k) of the spring based on this data.
3. In another scenario, the same block is placed on a surface with a coefficient of kinetic friction (μ). When the block is displaced by 10 cm and released, it comes to rest after traveling 15 cm. Determine the value of the coefficient of kinetic friction (μ).

