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SUBJECT:- PHYSICS CLASS:- IXTH DATE:13/03/XXI

SUBJECT TEACHER:- MR. NEEL NIRANJAN

CHAPTER 3. (GRAVITATION REVISION)(BASED ON NCERT PATTERN)

Q1. Illustrate the law of conservation of energy by discussing the energy changes which occur when we draw a pendulum bob to one side and allow it to oscillate. Why does the bob eventually come to rest? What happens to its energy eventually? Is it a violation of the law of conservation of energy?

Ans:- When the pendulum bob is pulled (say towards left), the energy supplied is stored in it is the form
Of PE on account of its higher position. When the pendulum is released so that it starts moving towards right, then its PE changes into KE such that in mean position, it has maximum KE, and Zero PE. As the pendulum moves towards extreme right, its KE changes into PE such that at the extreme position, it has maximum PE and zero KE. When it moves from this extreme position to mean position, its PE again changes to KE. This illustrates the law Of conservation of energy. Eventually, the bob comes to rest, because during each oscillation a part of the energy possessed by it transferred to air and in overcoming friction at the point of suspension. Thus, the energy of the pendulum is dissipated in air.
The law of conservation of energy is not violated because the energy merely changes its form and is not destroyed.

Q2. Calculate the work required to be done to stop a car of 1500 kg moving at a velocity of 60 km/h.

Mass of car, $m = 1500$ kg

Velocity of car, $v = 60$ km/h $= 60 \times \frac{5}{18}$ m/s

Kinetic energy, $E_k = \frac{1}{2}mv^2$

$$E_k = \frac{1}{2} \times 1500 \times \left(60 \times \frac{5}{18}\right)^2 = 208 \times 10^4 \text{ J}$$

To stop the car, an amount of work equal to E_k is required to be done.

Hence, 20.8×10^4 J of work is required to stop the car.