# HOTS (Higher Order Thinking Skills)

**Q. 1. Can any object have mechanical energy even if its momentum is zero? Explain.**

**Ans.** Yes, mechanical energy comprises of both potential energy and kinetic energy. Zero momentum means that velocity is zero. Hence, there is no kinetic energy but the object may possess potential energy.

**Q. 2. Can any object have momentum even if its mechanical energy is zero? Explain**

**Ans.** No. Zero mechanical energy means that there is no potential energy and no kinetic energy. Therefore, if kinetic energy is zero, becomes zero and hence, there will be no momentum.

Mathematically,

Mechanical energy = 0

$\Rightarrow$ PE = 0, KE = 0

$\Rightarrow$ $V = 0$

$\Rightarrow$ mv = p = 0

**Q. 3. Is it possible that an object is in the state of accelerated motion due to external force acting on it, but no work is being done by the force? Explain with example.**

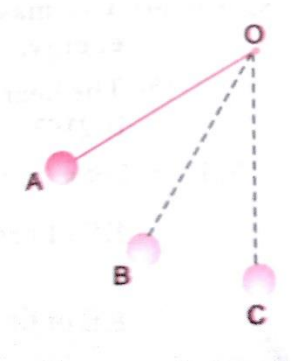
**Ans.** Yes, it is possible, if an object is moving in a circular path because force is always acting perpendicular to the direction of displacement.

**Q. 4. The diagram below shows a pendulum which was released from position A.**

**(a) What form(s) of energy did the pendulum have at**

**(i) A? (ii) B? (iii) C?**

**(b) Eventually the pendulum would stop moving. Explain what has happened to the initial energy of the pendulum.**




**Ans. (a) (i)** Potential energy

**(ii)** Potential energy + Kinetic energy

**(iii)** Kinetic energy

**(b)** The initial energy is transformed into heat energy when the pendulum bob strikes the air molecules. Thus, the amplitude of pendulum decreases and finally it stops.