ODM EDUCATIONAL GROUP
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ENERGY

CHAPTER NO.4

SUB: PHYSICS

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LEARNING OUTCOMES

Students will be able to:

- Define kinetic energy.
- Express kinetic energy in proper units.
- Solve simple problems based on kinetic energy.
- Define potential energy.
- Define gravitational potential energy.
- Solve problems based on gravitational potential energy.
- Describe energy transformation in daily life situation .
- Distinguish between energy and power.

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POINTS TO BE COVERED

- Energy
- Units of energy.
- Mechanical Energy.
- Potential energy.
- Kinetic energy.

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INTRODUCTION

https://youtu.be/lqV5L66EP2E

ENERGY

The capacity of a body to do work is called the energy of the body.

Unit of energy = Joules

1KJ = 1000 J

1 Joule: A body is said to possess an energy of 1 joule if it can do one joule work.

MECHANICAL ENERGY

- The energy possessed by a body due to its state of rest or state of motion is called mechanical energy.
- Mechanical energy is found in two forms.
- Potential energy
- Kinetic energy
- The total mechanical energy of a body is the sum of its potential energy and kinetic energy.

POTENTIAL ENERGY

- **POTENTIAL ENERGY:**
- The energy possessed by a body due to its position or shape is called its potential energy.
- For Example:
- Water stored in a dam has large amount of potential energy due to its height above the ground.
- A stretched rubber band possesses potential energy due to its distorted shape.
- **Types of Potential Energy**
- On the basis of position and change in shape of object, potential energy is of two types:
- **1. Gravitational Potential Energy:**
- It is the energy possessed by a body due to its position above the ground.
- **2. Elastic Potential Energy:**
- It is the energy possessed by a body due to its change in shape.
- **Expression for Potential Energy**
- The potential energy (E_p) is equal to the work done over an object of mass '*m*' to raise it by a height '*h*'.
- Thus, $E_p = mgh$, where g = acceleration due to gravity.
- https://youtu.be/RYG0_MPLMlw

FACTORS ON WHICH P.E DEPENDS

- F= mg
- S = h
- Potential energy = mgh
- So potential energy depends on the following factors:
- 1. The mass of the body
- 2. Its height above the ground.

KINETIC ENERGY

- It is the energy possessed by a body due to its motion. Kinetic energy of an object increases with its speed.
- Kinetic energy of body moving with a certain velocity = work done on it to make it acquire that velocity

EXPRESSION FOR KINETIC ENERGY

- Let an object of mass *m*, starts from rest and attains a uniform velocity *v*, after a force *F* is applied on it. Let during this period the object be be displaced by distance s.

Thus, Work done on object, $W = F \times s$ ....(i)

Let the acceleration produced after applying force on object be a.

So, using third equation of motion, we have:

$$v^2 - u^2 = 2as$$

$$\Rightarrow \quad s = \frac{v^2 - u^2}{2a} \quad \text{....(ii)}$$

Also, Force is given as, $F = ma$ ....(iii)

Substituting F and s frome quations (ii) and (iii) in equation (i), we get:

$$W = F \times s$$

$$\Rightarrow \quad W = ma \times \frac{v^2 - u^2}{2a}$$

$$\Rightarrow \quad W = \frac{1}{2} mv^2 \left[\text{As, initial velocity, } u = 0\right]$$

But, work done on object = Change in kinetic energy of object

$$\therefore \quad E_k = \frac{1}{2} mv^2$$

DIFFERENCE BETWEEN POTENTIAL ENERGY AND KINETIC ENERGY

Kinetic Energy	Potential Energy
Kinetic energy is the kind of energy present in a body due to the property of its motion	**Potential** Energy is the type of energy present in a body due to the property of its state
2.It can be easily transferred from one body to another	It is not transferable
3.The determining factors for kinetic energy are Speed or velocity and mass	The determining factors are Height/ distance and mass
It is the work done on the body to bring it to that state of rest or position.	It is equal to the work done in moving the body initially from rest.
It can change only in form of kinetic energy.	It ca change in any form of energy(potential energy, heat energy, light energy)

HOME ASSIGNMENT

- Exercise: B: 11,12,13,14

THANKING YOU

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