

UNIT VII - ENERGY (WITH LESS WORK)

Instructional Goals

1. View energy interactions in terms of transfer and storage

Develop concept of relationship among kinetic, potential & internal energy as modes of energy storage

emphasis on various tools (especially pie charts) to represent energy storage
apply conservation of energy to mechanical systems

2. Variable force of spring model (see lab notes: spring-stretching lab)

Interpret graphical models

area under curve on **F** vs **x** graph is defined as elastic energy stored in spring

Develop mathematical models

$$\mathbf{F} = k\mathbf{x}$$

$$E_{el} = \frac{1}{2}kx^2$$

3. Develop concept of working as energy transfer mechanism

Introduce conservation of energy

focus on $W = \Delta E$ in this unit

Working is the transfer of energy into or out of a system by means of an external force. The energy transferred, W is computed by $W = F_{\parallel} \cdot \Delta x$

the area under an F-x graph, where F is the force transferring energy.

Energy bar graphs and system schema represent the relationship between energy transfer and storage

4. Contrast conservative vs non-conservative forces

Energy transfers by conservative forces are reversible

5. Conservation of energy lab investigation - (see lab notes: 3 optional approaches)

6. Power (no specific labs)

Define power- rate at which energy is transferred:

$$P = \frac{W}{t}$$

SI unit: watt