

ATOMIC ENERGY CENTRAL SCHOOL, ANUPURAM

CH-6 Work Power and Energy (Handout 1/6)



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WORK

- Work is said to be done when a force applied on the body displaces the body through a certain distance in the direction of applied force.
- It is measured by the product of the force and the distance moved in the direction of the force, i.e., $W = F.S$
- If an object undergoes a displacement 'S' along a straight line while acted on a force F that makes an angle θ with S as shown.
- The work done W by the agent is the product of the component of force in the direction of displacement and the magnitude of displacement.

i.e.,
$$W = FS \cos \theta = \vec{F} \cdot \vec{S}$$

- Work done is a scalar quantity measured in newtonmetre.

Its dimension is $[ML^2T^{-2}]$.

(1 newton-metre = 1 joule)

- Following are some significant points about work done, derived from the definition given above.

(i) Work done by a force is zero if displacement is perpendicular to the force ($\theta = 90^\circ$).

(ii) Work done by the force is positive if angle between force and displacement is acute ($\theta < 90^\circ$).

(iii) Work done by the force is negative if angle between force and displacement is obtuse ($\theta > 90^\circ$).

- If the applied force varies with time/position, the work done is given by:

$$W = \int \vec{F} \cdot d\vec{s}$$

