POWER

The rate of doing work by an agency (body) is known as its power.

So, the average power delivered by the agency is given by

$$P_{av} = \frac{\Delta w}{\Delta t} \qquad ....(5)$$

Power is a scalar quantity and its unit is watt (w)

$$1 \text{ kw} = 10^3 \text{ watt} \quad , \quad 1 \text{ Mw} = 10^6 \text{ watt} \quad , \quad 1 \text{ hp} = 746 \text{ watt}$$

The instantaneous power delivered by the agency is given by

$$P_{inst} = \lim_{\Delta t \to 0} \left[\frac{\Delta w}{\Delta t} \right] \qquad ....(6)$$

$$\text{or, } P_{inst} = dw/dt \qquad ....(7)$$

If the body does equal amount of work in equal time interval, its average power is equal to the instantaneous power.

Again, since $\qquad W = \vec{F}.\vec{S}$

by eq. (7)

$$P_{inst} = \frac{d}{dt}(\vec{F}.\vec{S})$$

$$P_{inst} = \vec{F}.\frac{d\vec{s}}{dt}$$

$$P_{inst} = \vec{F}.\vec{V} \qquad ....(8)$$