



Studybeesofficial

Where Minds Pollinate

**Class 9
Physics**

Chapter 6

Handwritten Notes

Follow Our Socials

 **studybeesofficial**
 **studybeesofficialpak**
 **studybeesofficialpak**

4, 23, 2025

wednesday

Unit#06

"Work and Energy"

* Question and Answers-

1. A car is moving with a constant speed along a straight road - Is there any work done?

Ans) The work done on a body is given as $w = \vec{F} \cdot \vec{D}$, If a car is moving with constant velocity then, $\Delta U = 0$; $a = 0$
 $\therefore F = 0$

Now $w = 0 \times d$; $w = 0$

Hence work done on a car moving with constant velocity will be zero -

2.) Does the work done in raising box up in a building depends upon how fast is it? through which part, to much height?

Ans) .) The work done in raising a box up in the building depends on height to which is to be raised, In this case, the work done will be in form of potential energy -

$$W = E_p = mgh$$

.) The work done does not depend on path through which box is to be raised -

.) The work done does not depend on speed to which it has been ~~to~~ raised -

3) Work done on the body either speeds it up, slows it down. Keeping in mind, How much work it has done by centripetal force on an orbiting satellite.

The work done by centripetal force on an orbiting satellite is zero because centripetal force is always perpendicular (90°) to the satellite's direction of motion, resulting in no change in satellite speed.

$$W = Fd \cos \theta \quad ; \quad W = fd \cos 90^\circ$$
$$W = 0$$

23/04/25

Q) When will torque be maximum -

When force and moment arm are perpendicular to each other -

- By increasing force -
- By increasing moment arm -
- By increasing moment arm -

$$\tau = Fd \sin \theta$$

$$\tau = Fd \sin 90^\circ$$

$$\tau = Fd + l$$

$$\tau = l Fd$$

At point B::

$$E_{Tf} = E_{Kf} + E_{P,f}$$
$$= 20 + 0$$

$$E_{Tf} = 20J$$

Then

$$E_{Ti} = E_{Tf}$$

$$E_{Tf} - E_{Ti} = 0$$

$$\Delta E_T = 0$$

Power:: $(P = \frac{W}{T})$

Rate of doing work -

↓ Power $\propto \frac{1}{\text{Time}}$ ↑ (work must be constant)

Unit is watt = J/sec

Watt:- If one joule of work is done in one second

Quantity: scalar-

Prove that $P = \vec{F} \cdot \vec{U}$

$$P = W/T$$

$$P = \frac{\vec{F} \cdot \vec{d}}{T}$$

~~$$P = \vec{F} \cdot \vec{U}$$~~

$$P = \vec{F} \cdot \vec{U}$$

Horse power:- (hp)

$$1 \text{ hp} = 746 \text{ W}$$

if hp $\rightarrow$ watt

($\times$ by 746)

if watt $\rightarrow$ hp

($\div$ by 746)

$$P = \frac{W}{T} = \frac{E}{T}$$

$$P \times T = \text{Energy}$$

$$W \text{ s} = J$$

* Law of Conservation of Energy:-

$$\text{Final energy} = \text{initial energy}$$

There is no energy loss but energy can be converted to one form to another and total energy is constant

eg

(m) A $E_{PE} = 20J$
 $E_{KE} = 0J$

↓ h

O B

$$E_{PE} = 0J$$
$$E_{KE} = 20J$$

At point A:-

$$E_{Ti} = E_{KE} + E_{PE}$$
$$= 0 + 20$$

$$E_{Ti} = 20J$$

Efficiency :: Ratio of output and input -

$$\text{Efficiency} = \frac{\text{output}}{\text{Input}} \times 100$$

Efficiency in terms of work -

$$E_w = \frac{W_{\text{output}}}{W_{\text{input}}}$$

$$\therefore E_w = \frac{W_{\text{output}} \times 100}{W_{\text{input}}}$$

Efficiency in terms of Energy

$$E_w = \frac{E_{\text{output}} \times 100}{E_{\text{input}}}$$

Symbol :-

$\eta \rightarrow \text{eta}$

NP # 4

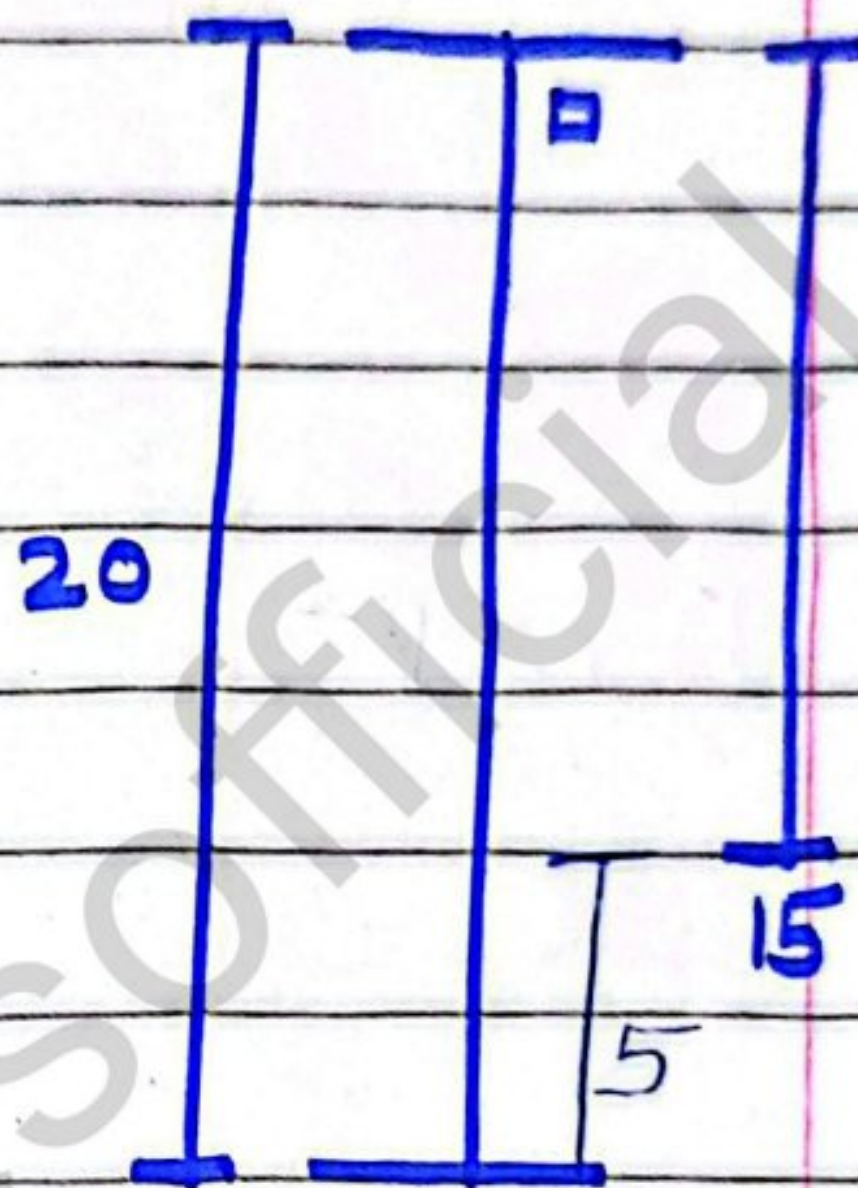
$$m = 2 \text{ kg}$$

$$h = 20 \text{ m}$$

$$K.E = ?$$

$$G.P.E = ?$$

$$h_1 = 15 \text{ m}$$



Sol

$$G.P.E = mgh$$

$$= (2)(9.8)(5)$$

$$= 98 \text{ Joule}$$

Gain in $K.E = \text{loss in } P.E$

$$K.E = mgh$$

$$= (2)(9.8)(15)$$

$$= 294 \text{ Joule}$$

NP#5

$$m = 800g = 0.8kg$$

$$u = 30 \text{ m/s}$$

$$a = h = ?$$

$$\text{Loss in } K.E = \text{gain in } P.E$$

$$\frac{1}{2} m u^2 = mgh$$

$$h = \frac{u^2}{2g}$$

$$h = \frac{(30)^2}{2(9.8)}$$

$$h = 45.92 \text{ m}$$

(6) $h_1 = 25 \text{ m}$

$$W_f = ?$$

$$\text{Loss in } P.E = \text{gain in } K.E + W_f$$

$$mgh = \frac{1}{2} m u^2 + W_f$$

$$W_f = mgh - \frac{1}{2} m u^2$$

$$w_f = (0.8)(9.8)\left(\frac{1}{2}\right)(0.8)(30)^2$$

NP:6

$$P = 2 \text{ hp}$$

$$= 2 \times 746$$

$$P = 1492 \text{ W}$$

$$m = 10 \text{ kg}$$

$$h = 10 \text{ m}$$

$$t = 1.5 \text{ sec}$$

(a) Input = ?

$$P = \frac{w}{t} \Rightarrow w = P \times t$$

$$= (1492)(1.5)$$

$$w = 2238 \text{ Joule}$$

(b) Output = ?

$$= mgh$$

$$= (10)(9.8)(10)$$

$$= 980 \text{ Joule}$$

$$(c) \quad \%E = \frac{\text{output}}{\text{input}} \times 100$$

$$\%E = \frac{980}{2239} \times 100$$

$$\%E = 43.8\%$$

NP# 7

$$P = ?$$

$$m = 2500 \text{ kg}$$

$$h = 100 \text{ m}$$

$$t = 5 \times 60$$

$$t = 300 \text{ s}$$

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

$$= \frac{mgh}{t}$$

$$= \frac{8166.67 \text{ W}}{746}$$



STUDYBEESOFFICIAL

LEARN • GROW • SUCCEED

FOLLOW OUR WHATSAPP CHANNELS **5**

	Studybeesofficialpak HSSC 📖 Notes • Past Papers • Updates	CLICK ME TO JOIN CHANNEL 
	Studybees SSC 📖 Notes • Past Papers • Updates	CLICK ME TO JOIN CHANNEL 
	Studybees EntryTest 🎯 Preparation • MCQs • Updates	CLICK ME TO JOIN CHANNEL 
	Studybees Foreign scholarships 🌐 Scholarships • Guidance • Opportunities	CLICK ME TO JOIN CHANNEL 
	Studybees MDCAT ➕ Notes • Tests • Guidance • Updates	CLICK ME TO JOIN CHANNEL 

FOLLOW US ON OTHER PLATFORMS

	YouTube Channel Studybeesofficialpak	CLICK ME TO JOIN CHANNEL 
	Facebook Page studybeesofficial Pak	CLICK ME TO JOIN CHANNEL 
	Instagram studybeesofficial	CLICK ME TO JOIN CHANNEL 

Stay Connected, Stay Ahead!



QUALITY
CONTENT



EXAM
PREPARATION



CAREER
GUIDANCE



OPPORTUNITIES