VIDYA BHAVAN, BALIKA VIDYAPEETH

SHAKTI UTTHAN ASHRAM, LAKHISARAI, PIN:-811311

SUBJECT:- PHYSICS CLASS:- 9th DATE:- 22/01/XXII

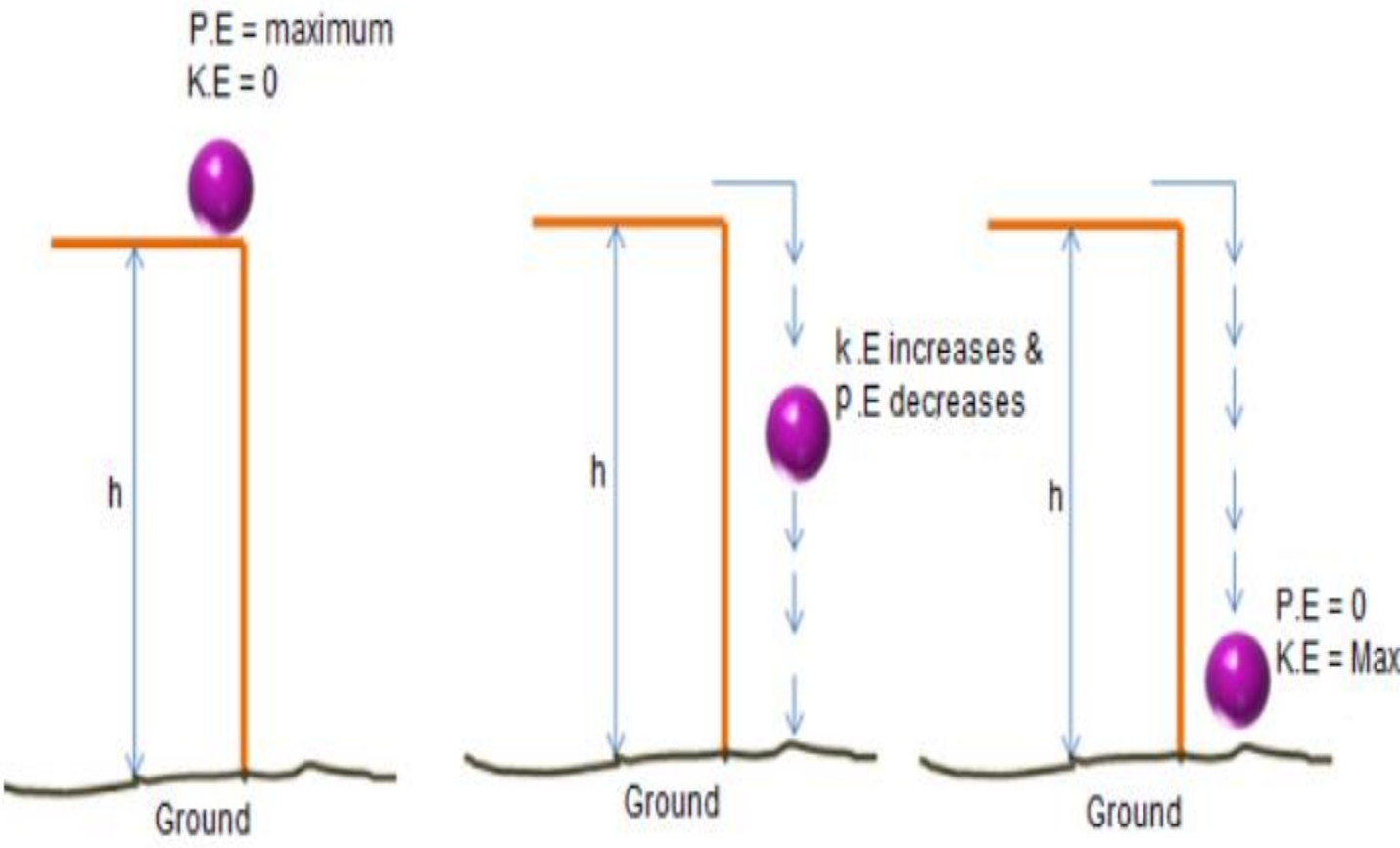
SUBJECT TEACHER:- MR. NEEL NIRANJAN

CHAPTER 4. (WORK, ENERGY & POWER) (BASED ON NCERT PATTERN)

Law of Conservation of Energy

According to the law of conservation of energy, the total amount of energy before and after transformation remains the same.

Consider the following example where an object of mass ‘m’ is made to fall freely from a height ‘h’.



Instant	Height at an instant	Kinetic Energy	Potential Energy	Sum of KE + PE = ME
1	Height = h	0 (velocity is 0)	mgh	0 + mgh
2	Height = k	(1/2) $mv1^2$ (velocity = v1)	mgk	(1/2) mv_1^2 + mgk
3	Height = 0	(1/2) $mv2^2$ (velocity = v2)	0	(1/2) mv_2^2

We can see that the sum of kinetic energy and potential energy at every instant is constant. Hence, we can say the energy is conserved during transformation.

Power - The rate of doing work is defined as Power.

Power = Work Done / Time
P = W/ t
SI Unit: W (Watt) or J/s
1 kilowatt = 1000 watts
1 kW = 1000 W
1 W = 1000 J s^{-1}
Average Power = Total Energy Consumed / Total Time taken

Commercial Unit of Power

We cannot use Joule to measure power commercially. Instead, we use kilowatt-hour (kWh).

Commercial unit of energy = 1 kilowatt hour (kwh)

∴ 1 kWh = 1 kilowatt × 1 hour

= 1000 watt × 3600 seconds

= 3600000 Joule (watt × second)

1 kWh = 3.6×10^6 J.

∴ 1 kWh = 1 unit

The energy used in one hour at the rate of 1 kW is called 1 kWh.