Q: NO: 2:

Sol:

P : 100 + student ID

UDL: 150 + " "

P = 100 + 16195 = 16.295 KN

UDL = 150 + 16195 = 16.345 KN/m

Distributed load can replaced by single load.

By simple calculation

UDL = 16.345 KN/m

The distance at which load is distributed is 6m

point load = 16.345 x 6

point load = 98.07

point

Find Reaction ~~(3)~~ (2)
~~of~~ support Now

Clockwise = +ve

Anti Clockwise torque = −ve

$\Sigma MA = 0$

$16295 \times 3 + 98.07 \times 9 - RB \times 12 = 0$

~~48~~

$48.885 + 882.63 = 12 RB$

$RB = \frac{931.515}{12}$

$RB = 77.62$

~~ΣB~~ $\Sigma MB = 0$

(3)

Clockwise torque = +ve

Anti " " = −ve

$12 R_A = 16.295 \times 9 - 98.07 \times 3$

$12 R_A = 16.295 \times 9 \times 98.07 \times 3$

~~$12 R_A = 146.673$ KNm + 29~~

$12 R_A = 146.655 + 294.21$

$$R_A = \frac{440.865}{12}$$

$R_A = 36.73$

Q : NO. 1

P_1 = 200 + student ID
P_2 = 500 + student ID

P_1 = 200 + 16195 = 16395

P_2 = 500 + 16195 = 16695

R_a = ?
R_b = ?

Clockwise torque = +ve
Anti " " " = −ve

$\Sigma M_A = 0$

⇒ 16695 * 3 + 16.395 × 9 − R_B × 18

16695 × 50.085 + 147.55 = 18 R_B

$$R_B = \frac{197.64}{18}$$

$$R_B = 10.98 \text{ KN}$$

Now for solving R_A

$$R_A \times 18 - 15(16.695) - 9(16.395) = 0$$

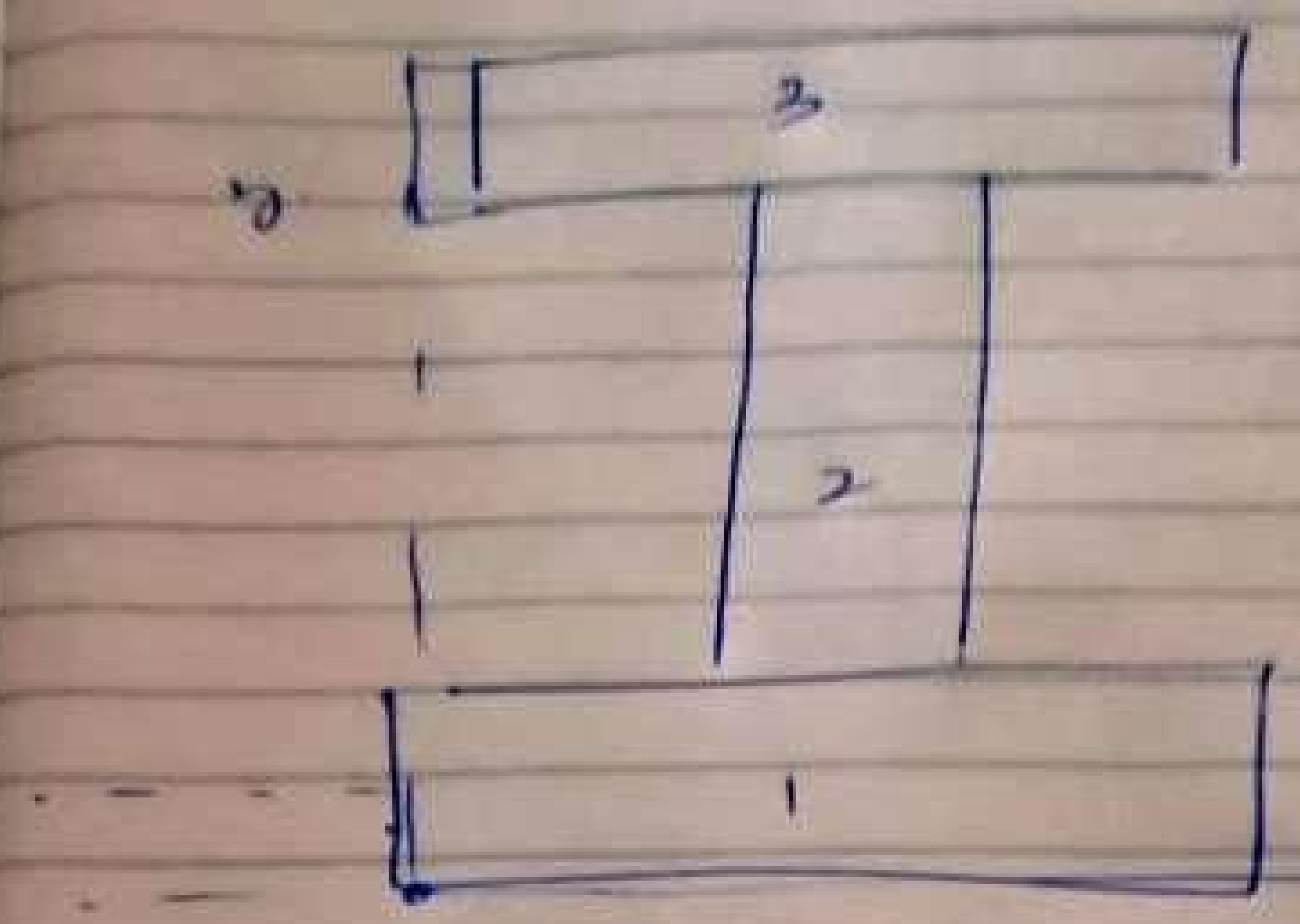
$$18R_A = 250.425 + 147.555$$

$$R_A = \frac{397.98}{18}$$

$$R_A = 22.11 \text{ KN}$$

Q #04

(a). For Centroid



$\bar{x} A_t = x_1 A_1 + x_2 A_2 + x_3 A_3$

$90 \times 35 \times 45 + 35 \times 65 \times 17.5$

$+ \quad 65 \times 15 \times 32.5$

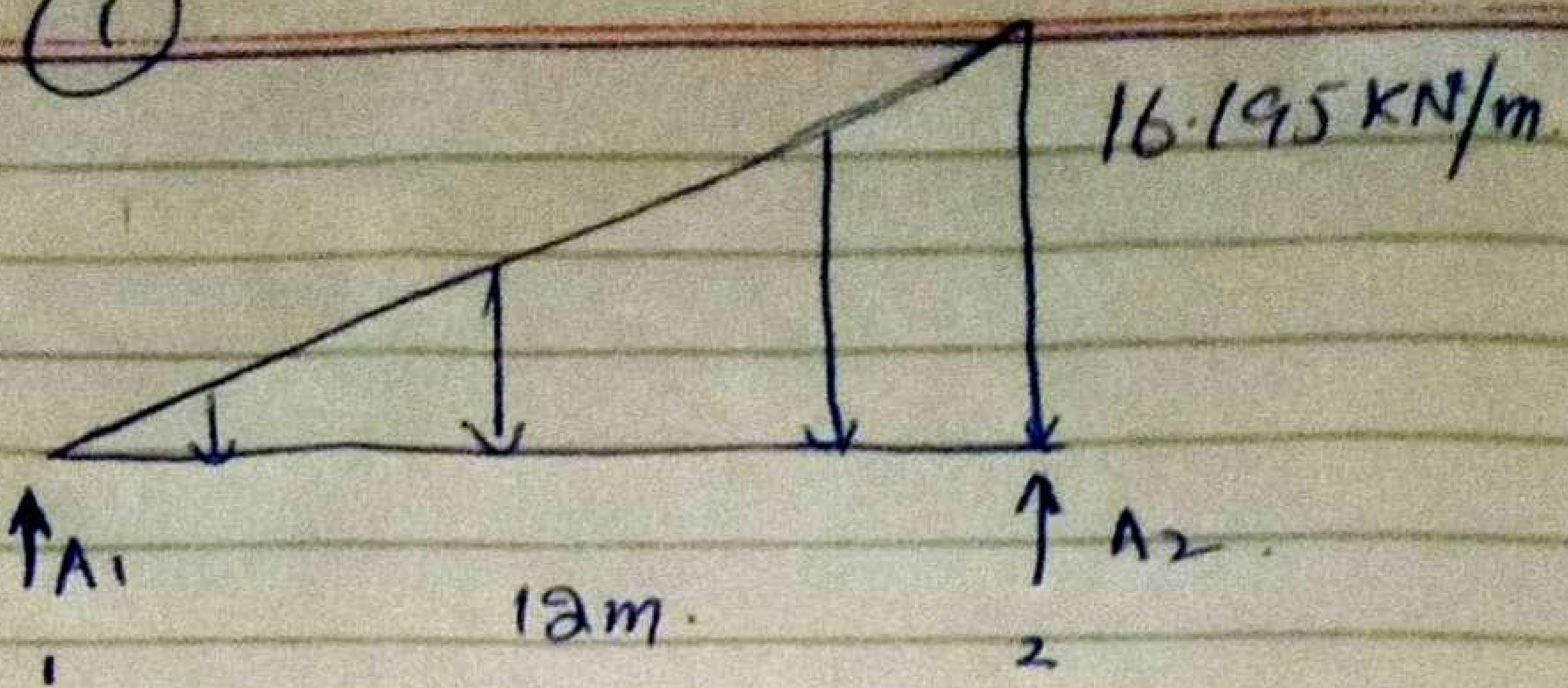
$\boxed{\bar{x} = 33.32 \text{ cm}}$

$\bar{y} A_t = y_1 A_1 + y_2 A_2 + y_3 A_3$

$\bar{y} = 41.36 \text{ cm}$

$\boxed{C(x, y) = (33.32, 41.36)}$

Q#3 (i)



$\Sigma M_1 = 0.$

$\cancel{12} A_2 = \frac{1}{\cancel{2}} \times 16.195 \times \cancel{12} \times 8$

$A_2 = 64.78$ KN

$A_1 = 32.39$ KN

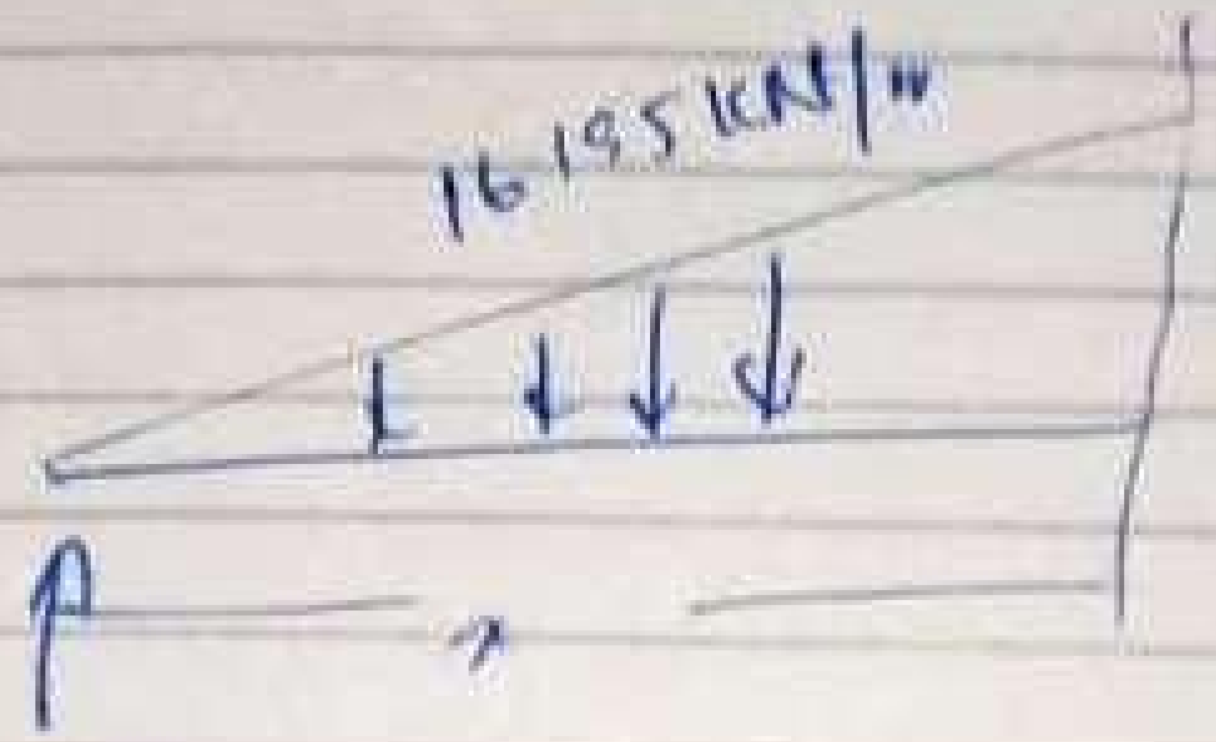
(a)

Shear force equations

$V(x) = A - 8.0975x$

$M(x) = \left(A - 8.0975x\right)\frac{2}{3}x$

$= \frac{2}{3}Ax - 5.39833x^2$

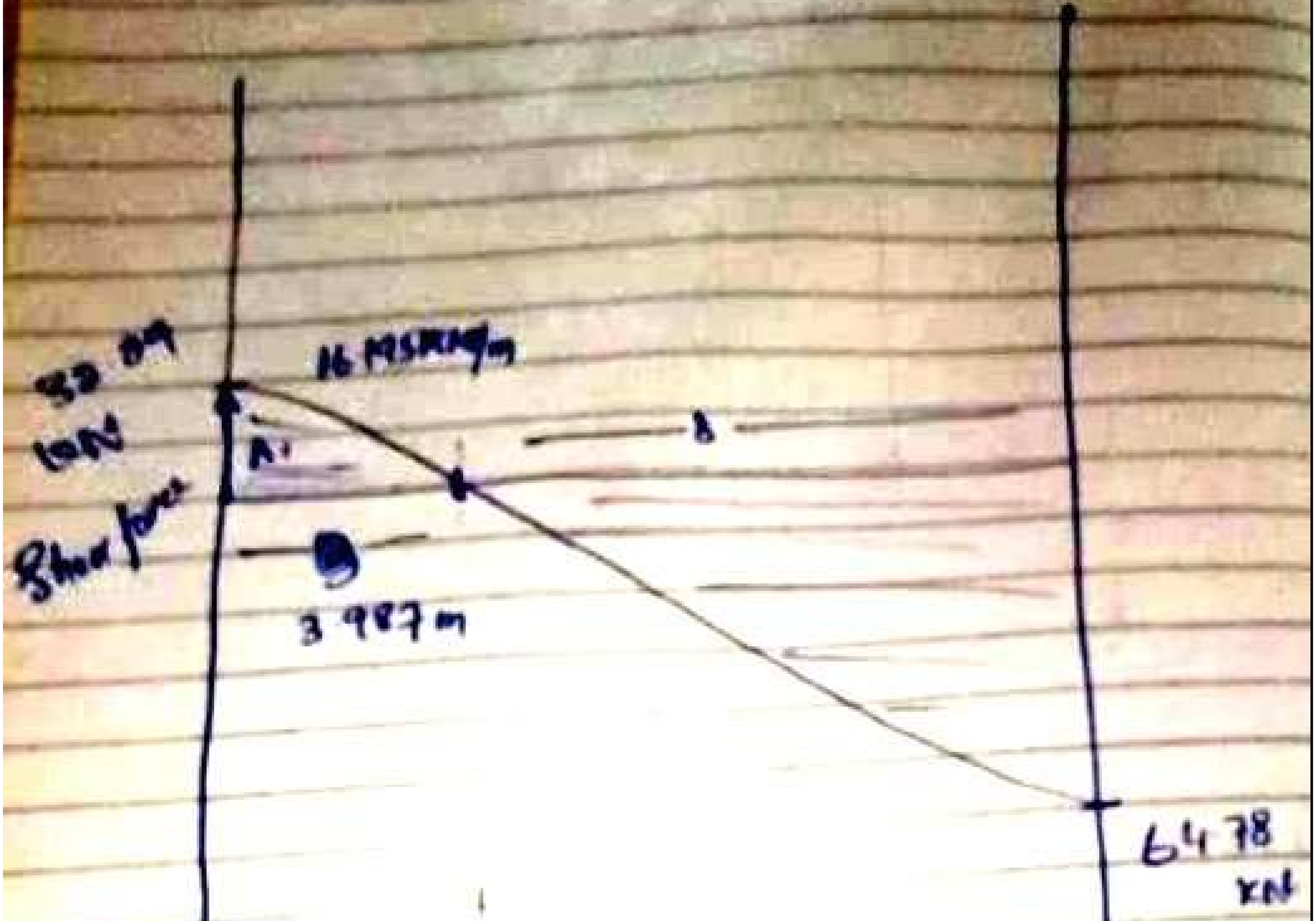


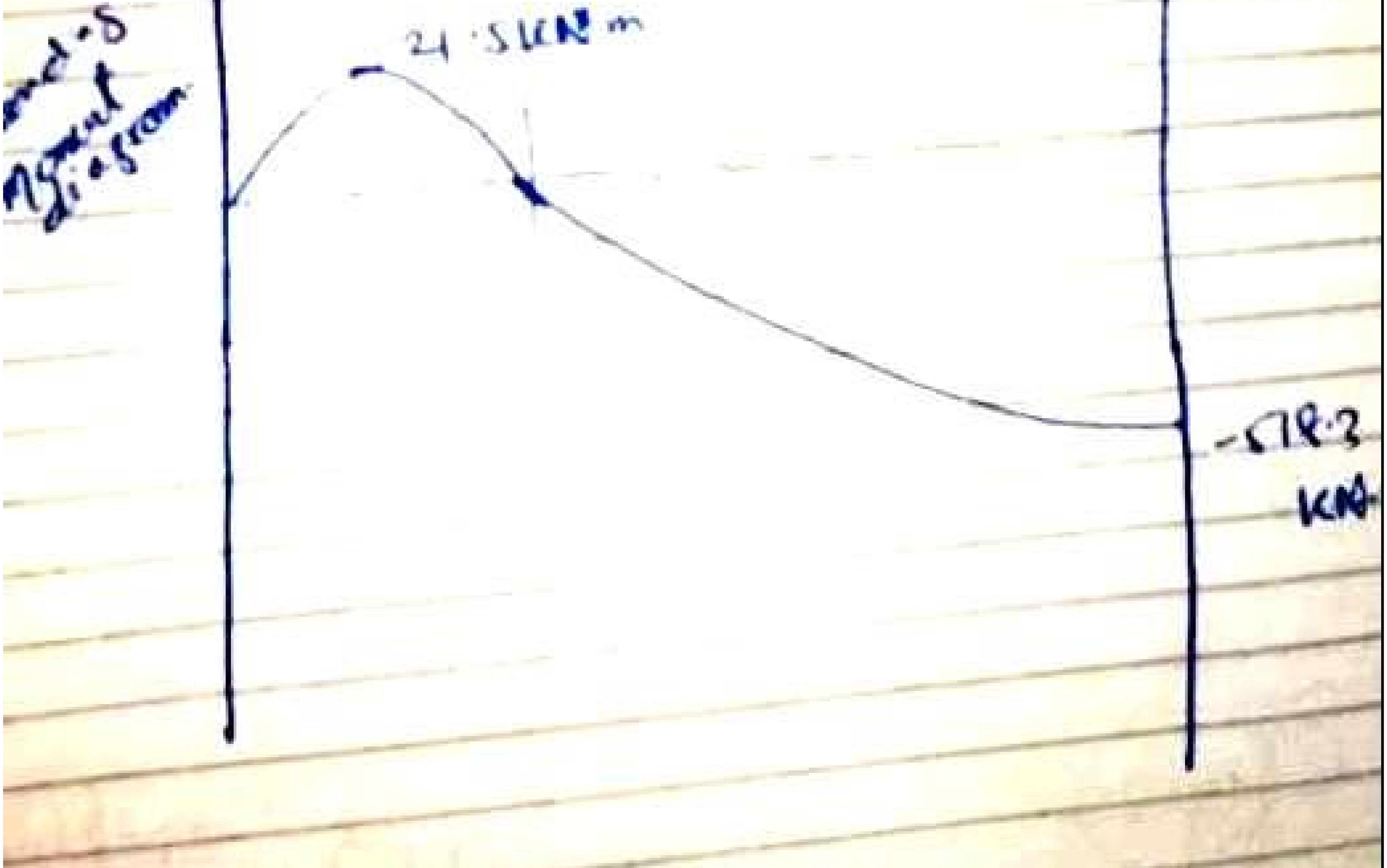
point on which shear force crosses neutral line is

$a = 3.987\ m$

$M(x) = 164.64\ N\cdot m$

Shear force diagram





Q#10

(b).

$$I_x = \frac{bh^3}{12}$$

$$= \frac{35 \times 65^3}{12}$$

$$= 800989.583\ cm^4$$

$$I_x = 0.008\ m^4$$

Q#4

(b).

$$I_x = \frac{bh^3}{12}$$

$$= \frac{35 \times 65^3}{12}$$

$$= 800989.583 \text{ cm}^4$$

$$I_x = 0.008 \text{ m}^4$$

Radius of Gyration

$$r = \sqrt{\frac{I}{A}}$$

$$= \sqrt{\frac{0.008}{35 \times 65 \times 10^{-4}}}$$

$$r = 18.76 \text{ cm}$$

Scanned by TapScanner

Section Modulus =

$$S = \frac{I}{y}$$

$$= \frac{801989.87}{57.5}$$

$$S = 13930.25 \text{ cm}^3$$

Work, Energy and Power

Definitions

Work can be defined as transfer of energy. In physics we say that work is done on an object when you transfer energy to that object. If one object transfers (gives) energy to a second object, then the first object does work on the second object.

Work is the application of a force over a distance. Lifting a weight from the ground and putting it on a shelf is a good example of work. The force is equal to the weight of the object, and the distance is equal to the height of the shelf (W= Fxd).

Work-Energy Principle --The change in the kinetic energy of an object is equal to the net work done on the object.

Energy can be defined as the capacity for doing work. The simplest case of mechanical work is when an object is standing still and we force it to move. The energy of a moving object is called kinetic energy. For an object of mass m, moving with velocity of magnitude v, this energy can be calculated from the formula E= 1/2 mv^2.

Types of Energy

There are two types of energy in many forms:

Kinetic Energy = Energy of Motion

Potential Energy = Stored Energy

Forms of Energy

Solar Radiation -- Infrared Heat, Radio Waves, Gamma Rays, Microwaves, Ultraviolet Light

Atomic/Nuclear Energy -energy released in nuclear reactions. When a neutron splits an atom's nucleus into smaller pieces it is called fission. When two nuclei are joined together under millions of degrees of heat it is called fusion

Electrical Energy --The generation or use of electric power over a period of time expressed in kilowatt-hours (kWh), megawatt-hours (NM) or gigawatt-hours (GWh).

Chemical Energy --Chemical energy is a form of potential energy related to the breaking and forming of chemical bonds. It is stored in food, fuels and batteries, and is released as other forms of energy during chemical reactions.

Mechanical Energy -- Energy of the moving parts of a machine. Also refers to movements in humans

Heat Energy -- a form of energy that is transferred by a difference in temperature

What is Power

Power is the work done in a unit of time. In other words, power is a measure of how quickly work can be done. The unit of power is the Watt = 1 Joule/ 1 second.

One common unit of energy is the kilowatt-hour (kWh). If we are using one kW of power, a kWh of energy will last one hour.

Calculating Work, Energy and Power

WORK = $W=Fd$

Because energy is the capacity to do work , we measure energy and work in t same units (N*m or joules).

POWER (P) is the rate of energy generation (or absorption) over time:P = E/t

Power's SI unit of measurement is the Watt, representing the generation or absorption of energy at the rate of 1 Joule/sec. Power's unit of measuremer in the English system is the horsepowe which is equivalent to 735.7 Watts.