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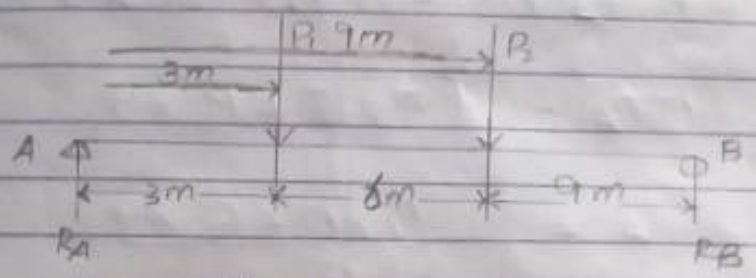
ID = 16269

Q2 Find the support Reactions:

P_1 = 200 + 16269 = 16469

P_2 = 500 + 16269 = 16769



I'm taking from left hand side

R_A = ? R_B = ?

$\Sigma M_A = 0$

clockwise +ve & Anticlock wise -ve

$+(3 \times P_1) + (9 \times P_2) - (R_B \times 12) = 0$

$$R_B = \frac{(3 \times P_1) + (9 \times P_2)}{12}$$

Now put the values

$$= \frac{(3 \times 16469) + (9 \times 16769)}{12}$$

R_B = 16,694

(2)

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$R_A = ?$

$\Sigma_{MB} = 0$

$+ R_A \times 18 - P_1 \times 15 - P_2 \times 9 = 0$

$18 R_A = P_1 \times 15 + P_2 \times 9$

$R_A = \frac{P_1 \times 15 + P_2 \times 9}{18}$

Put the values

$= \frac{(16469 \times 15) + (16769 \times 9)}{18}$

$R_A = 22108.66$

$R_A + R_B = P_1 + P_2$

$38802 \neq 33238$

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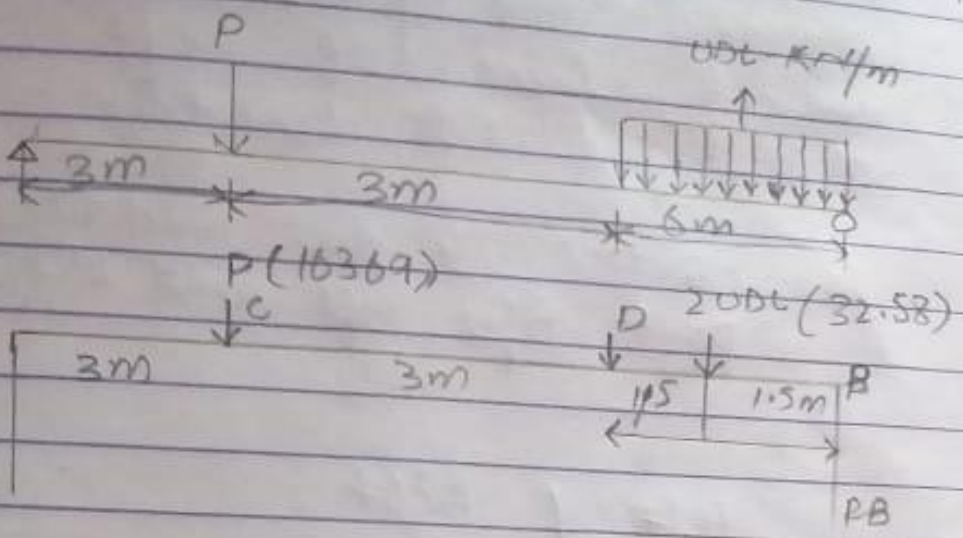
Q 2:

$P = 100 + 16269 = 16369$

$UDL = 16269/1000 = 16.269$



Taking Moment in (A)

$M = F \cdot D$

Anticlockwise = clockwise

$RB \times UDL = (P \times 3) + (2UDL \times 9)$

$RB = \dfrac{(P \times 3) + (2UDL \times 9)}{UDL}$

put the values

$= \dfrac{49,107 + 293.22}{16.269}$

$= 3036.46$

$RA + RB = P + 2UL$

$RA = 16369 + 32.58 - 3036.46$

R_A = 13,365

S.F calculation :

Algebraic sum of unbalance vertical forces of left or Right side section.

∴ section is the middle part Bfw left and Right.

left / Right

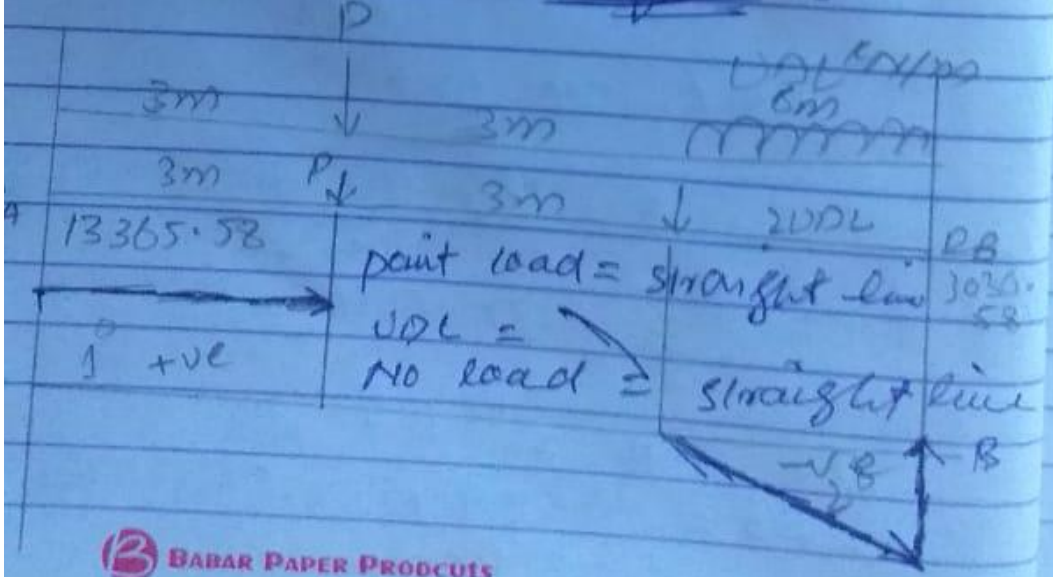
S.F at A = +13,365.58

S.F at C = -P+P = 0

S.F at D = 0

S.F at B = 3036.46

Shear Force Diagram :-



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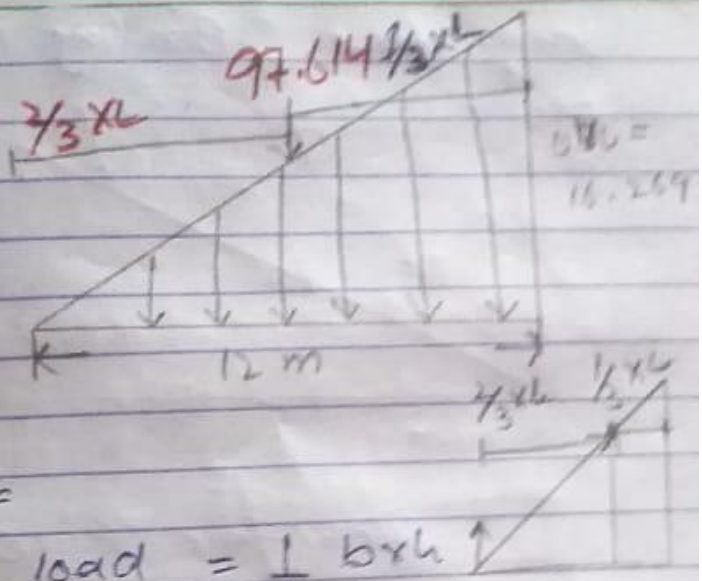
Q3:-



Solution =

Total load $= \frac{1}{2} b \times h$

$= \frac{1}{2} \times 12 \times 16.259$

$= 97.614$

$\Sigma_{MA} = 0$

$97.614 \times \frac{3}{2} \times 12 - RB \times 12 = 0$

$RB = 65.076$

$\Sigma_{fy} = 0$ vertical forces

+↓ ↑ -ve

$97.614 - RB - RA = 0$

$RA = 97.614 - 65.076$

$RA = 41.558$

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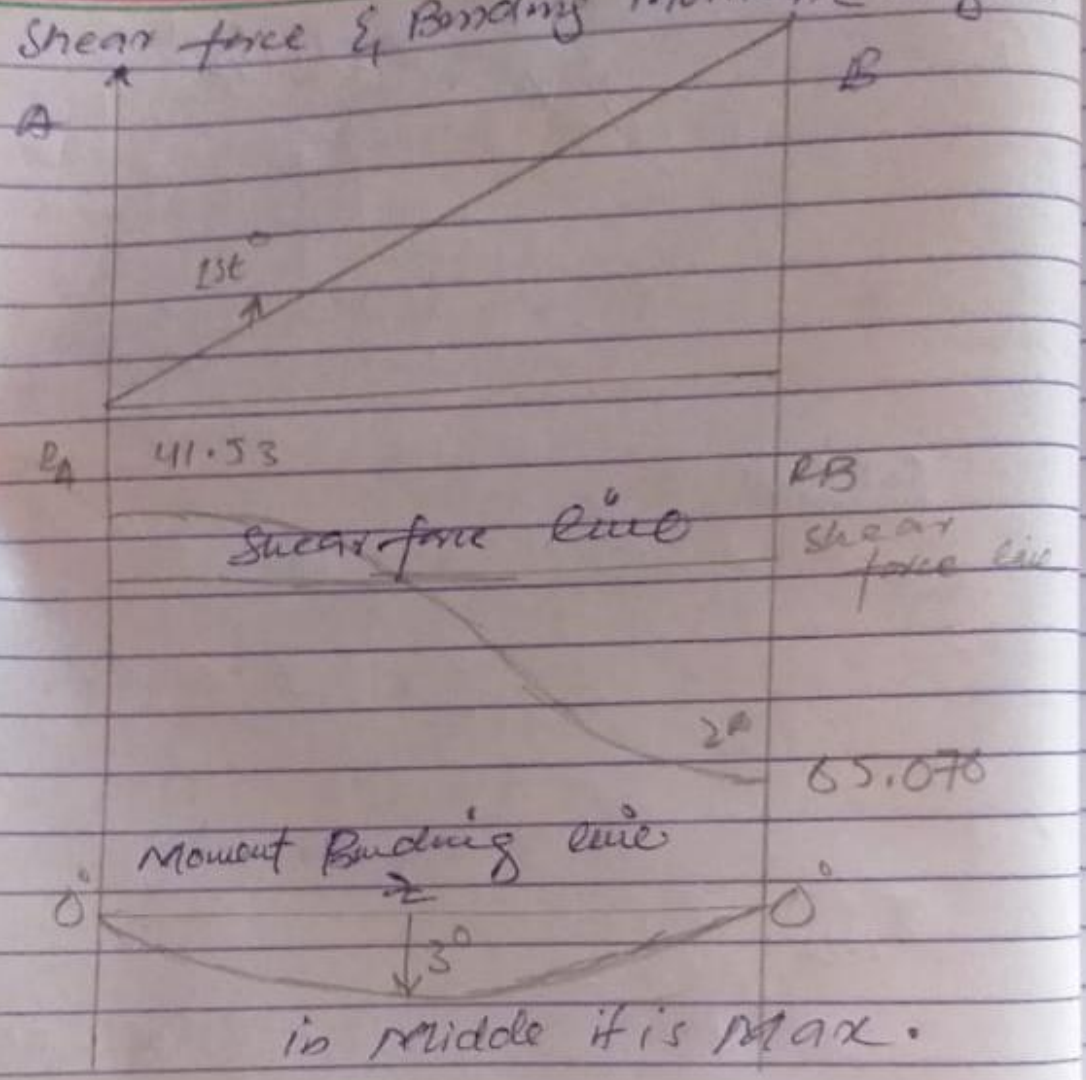
Shear force & Bending Moment Diagram



B.M calculations:

Algebric sum of unbalance vertical left or right side section

left Right

B.M at A = 0

B.M at 2 = 3

B.M at B = 0

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Q4 $x_c = 45\text{cm}$

$y_c = 48.95\text{cm}$

Calculation:

$A_1 = 90\text{ cm} \times 85\text{cm} = 3150\text{cm}$

$A_2 = 65\text{cm} \times 35\text{cm} = 2275\text{cm}^2$

$A_3 = 65 \times 15 = 975\text{cm}^2$

$\Sigma_A = A_1 + A_2 + A_3 = 6400\text{cm}^2$

As there is Axis of Symetry

$x_1 = x_2 = x_3 = \frac{90}{2} = 45\text{cm}$

$y_1 = \frac{85}{2} = 17.5\text{cm}$

$y_2 = \frac{65}{2} + 35 = 67.5\text{cm}$

$y_3 = \frac{15 + 65 + 35}{2} = 107.5\text{cm}$

$x_c = \frac{A_1 x_1 + A_2 x_2 + A_3 x_3}{A_1 + A_2 + A_3}$

$= \frac{(3150)(45) + (2275)(45) + (975)(45)}{6400}$

$x_c = 45\text{ cm}$

(8)

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

$$= \frac{(3150)(17.5) + (2275)(67.5) + (975)(107.5)}{6400}$$

$$= 48.95 \text{ or } 49 \text{ cm}$$

PART B: Given Data:

Area = 65 cm × 35 cm

Req. = ?

Moment of inertia = ?

Radius of gyration = ?

Section of Modoli = ?

(a) For moment of inertia

$$I_x = \frac{1}{3} bh^3$$

$$= \frac{1}{3} (65)(35)^3$$

$$= 928958 \text{ mm}^4$$

$$I_y = \frac{1}{3} b^3 h$$

$$= \frac{1}{3} (65)^3 (35)$$

$$= 3203958 \text{ mm}^4$$

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$\bar{I}x = \frac{1}{12} bh^3$

$= \frac{1}{12} (65)(35)^3$

$= 66351.41 \text{ mm}^4$

$\bar{I}y = \frac{1}{12} b^3 h$

$= \frac{1}{12} (65)^3 (35)$

$= 800989 \text{ mm}^4$ — (i)

$Ic = \frac{1}{12} bh(b^2 + h^2)$

$= \frac{1}{12} (65)(35)((65)^2 + (35)^2)$

$= 1033229 \text{ mm}$

(b) Section Modulus

$S = \frac{bh^2}{6}$ Put values

$= \frac{65 (35)^2}{6}$

$S = 13270.83 \text{ mm}^4$

(c) Radius of Gyration

$r = \left(\frac{I}{A}\right)^{1/2}$ — (ii)

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$A = b \times d$

$= 65 \times 35$

$A = 2275$

Now put values in eq (i) {(ii)

Here ~~the formula~~

$$Y = \left(\frac{1}{A}\right)^{1/2}$$

$$Y = \left(\frac{1033229}{2275}\right)^{1/2}$$

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Q5:

WORK

The product of force and displacement is called work.

A force is said to be positive work when the the applied force has a component in the direction of the point of Application. A force does negative work if the force component opposite to the direction of displacement at the point of application of the force.

For Example:-

When a ball is held above the ground and then dropped, the work done by gravitational force on the ball as it falls is equal to weight of the ball (Force) multiply by the distance

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to the ground (displacement).
when the force is constant
and the angle b/w force and
displacement s is θ.

then the work done is
given by $W = F \cdot S \cos\theta$.

S.I unit is Joule (J)

"ENERGY"

The capacity of body
for doing work.

It may exist in potential
thermal, kinetic, chemical,
nuclear, electrical or in
either various forms ie

Energy in the process of
transfer from one body
to other.

Example:

light energy → heat
energy → gravitational energy
chemical energy → mech
anical energy.

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We divid our energy use four enaomic sectors.

* Commertial, transportation, Residental and industrial.

Heating and cooling home existing office, buildings, driving and manufacturing the products that we use in our daily life. Are the formatuon required by Energy.

POWER

The of doing work, It is the work done unit time. The S.I unit of power is watt (w). which is (J/s)

Some time the power of motors, car, vechicles and other type of appliam are given in term of Horse power (Hp).

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which is approximately equal to 745.7 (watt) w.

Examples:

Power needed to run dams, several cars (vechicles) to miles.

Power is the authority of local Government hasing NEPRA. PESCO specify wapda.

END