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I'D ; 16312

Section : B (civil - engineering)

a:-

Sol: $P_1 = 200 + 16312 = 16512$

$P_2 = 500 + 16312 = 16812$

$R_A = ?$

$R_B = ?$

clock wise torque = +ve $= \Sigma M_A = 0$

Anti clock wise = -ve

$\Rightarrow 16812 \text{ KN} \times 3 + 16.512 \times 9 - R_B \times 18 = 0$

$= 16812 \times 3 + 16.512 \times 9 = 18 R_B$

$= 50.436 + 148.608 = 18 R_B$

$= 199.044 = 18 R_B$

$R_B = \frac{199.044 \text{ KN}}{18}$

$R_B = 11.058 \text{ KN}$

Now solving for R_A.

$\Sigma R_B = 0$ +ve (↑ ve.

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$= RA \times 18 - 15(16.812) - 9(16.512)$

$18\,RA = 252.18\ KNm + 148.608$

$18\,RA = 400.788\ KNm$

$$RA = \frac{400.788\ KNm}{18\ N}$$

$RA = 22.226\ KN.$

$RA + RB = P_1 + P_2$

$RA + RB = 22.226 + 11.058 = 33.284$

$P_1 + P_2 = 816.512 + 168.812 = 33.324$

PTJ

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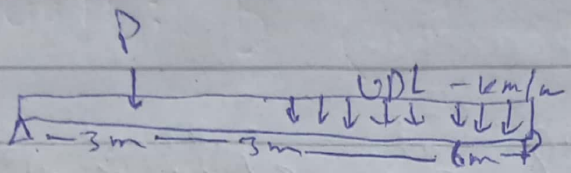
Q 2



Sol = P = 100 + student ID.

UDL = 150 + student ID.

student ID = 16312

P = 100 + 16312 = 16412 N

= 16.412 KN

UDL = 150 + 16312 = 16462 N

= 16.462 KN/m

The uniform distributed load can replaced by a single load by a simple calculation

UDL = 16.462

The distance at which load is distanguished

So, Point load = 16.462 KN x 6m

Point load = 98.772.

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Now

finding reaction at support A & B

RA = ?

RB = ?

clock wise torque = +ve

Anti clock wise torque = -ve

$\Sigma M_A = 0$

$16.412 \times 3 + 98.772 \times 9 - RB \times 12 = 0$

$49.236 \text{ kNm} \times 888.948 \text{ kNm} = 12 RB$

$12 RB = 938.22$

$RB = \frac{938.22 \text{ kNm}}{12 \text{ m}} = 78.185 \text{ kN}$

Now

$\Sigma M_O = 0$

clockwise torque = +ve

Anti clock wise torque = -ve

$12 RA - 16.412 \times 9 - 98.772 \times 3 = 0$

$12 RA = 16.412 + 98.772 \times 3 = 0$

$12 RA = 144.780 + 296.316 \text{ kNm}$

$12 RA = 449.096 \text{ kNm}$

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RA

$$RA = \frac{444.096 \text{ kNm}}{12 \text{ m}}$$

$$= RA = 37.008$$

$$RA + RB = P_1 + P_2$$

$$= 37.008 + 78.185 = 16.412 + 98.77$$

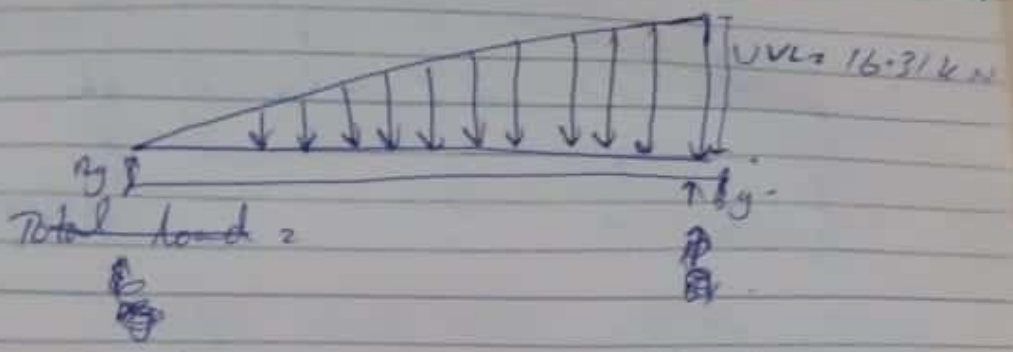
$$= 115.008 = 115.184$$

(98.77

Ans

B

Q3 ①



Total load =

Total load = area of triangle

Total load = $\frac{1}{2} \times L \times UVL$

Total load = $\frac{1}{2} \times 12 \times 16.31$.

Total load = 97.86 kN.

Now

$+\uparrow \Sigma F_y = 0$.

$$A_y + B_y = 97.86 \text{ kN} \longrightarrow ①$$

$\overset{+}{\circlearrowleft} \Sigma M_A = 0$

$B_y \times 12 - 97.86 \times \frac{2}{3} L = 0$

$B_y \times 12 - 97.86 \times 8 = 0$

$B_y = 65.24$ kN. putting into ①

① ⇒ $A_y = 32.62$ kN

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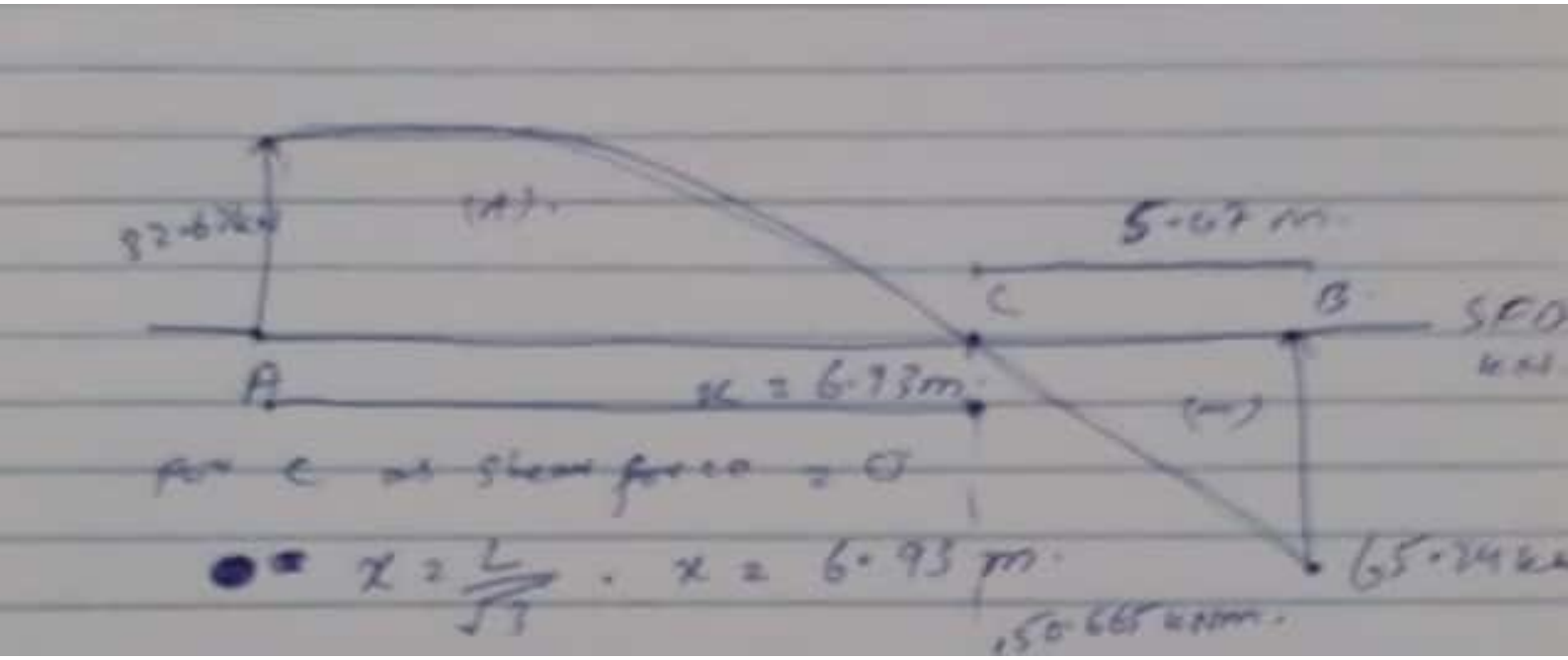

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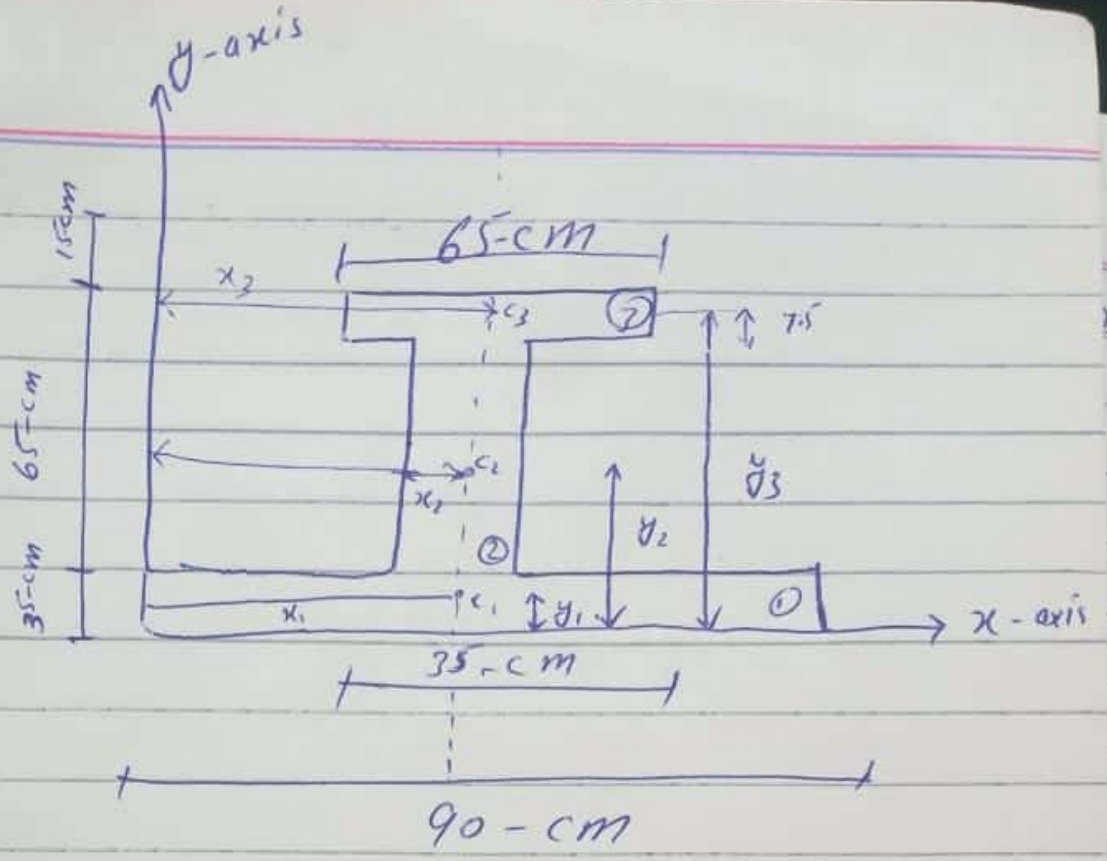

		cm		cm	
A_1	$3150cm^2$	x_1	45	y_1	17.5
A_2	$2275cm^2$	x_2	45	y_2	67.5
A_3	$975cm^2$	x_3	45	y_3	107.5

$$\Sigma A = 6400\,cm^2$$

$$x_c = \frac{Ax_1 + Ax_2 + Ax_3}{A_1 + A_2 + A_3} = \frac{6400(45) + 6400(45) + 6400(45)}{3150 + 2275 + 975}$$

$$\bar{y}_c = \frac{A\bar{y}_1 + A\bar{y}_2 + A\bar{y}_3}{A_1 + A_2 + A_3}$$

$$= 6400(11.5) + 6400(67.5) + 6400(10$$

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Given Data

area = 65cm x 35cm

Required ?

moment of Inertia ?
Radius of Gyration ?
Section of moduli ?

For moment of Inertia

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

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

$= \frac{1}{3}(65)(35)^3 = 928958 mm^4$

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

$\frac{1}{3}(65)^3(35) = 3203958 mm^4$

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(2)

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

$$= \frac{1}{12}(65)(35)^3 = 66835.41\ mm^4$$

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

$$\frac{1}{12}(65)^3(35) = 800989\ mm^4$$

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

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

$$= 1033229.16\ mm^4$$

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2275

$\bar{y} = 21.31$ mm

(c) section modulus

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

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

$$S = 1327$$

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by that gave through both
force and displacements are vector
quantities work has no direction
due to nature of a scalar
product is vector.

Example of work: There are many
many examples of
work in every day life. Few of
them are; a father pushing grocery
cart down the aisle of a grocery
store; a student lifting a
bag full of books on his shoulder

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⇒ Power = work/time $(P = W/t)$

Unit of Power:-

The unit of standard metric work is joule and the standard metric unit for time is second, so the standard metric unit of power is joule/second defined as a watt and abbreviated is W.

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Work

Work is defined as a force causing the movement or displacement of an object. In the case of constant force work is the product of the force and the displacement caused by that force through both quantities work has no direction are to nature of a scalar product is vector.

Example of works There are many work in every day life. Few of them are; a father pushing grocery cart down the aisle of a grocery store; a student lifting a bag full of books on his shoulder A horse pulling a plow through a feild and an olympian launching the shot-put

In general for work to occur a force has to be exerted causing it to move. So a frustrated person pushing against a wall only to exhaust himself is doing any work because the wall doesn't move

Mathematical form of work: $W = F \cdot d$

$W = 10\,N * 2\,meter$

$\Rightarrow$ work = 20 joules

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