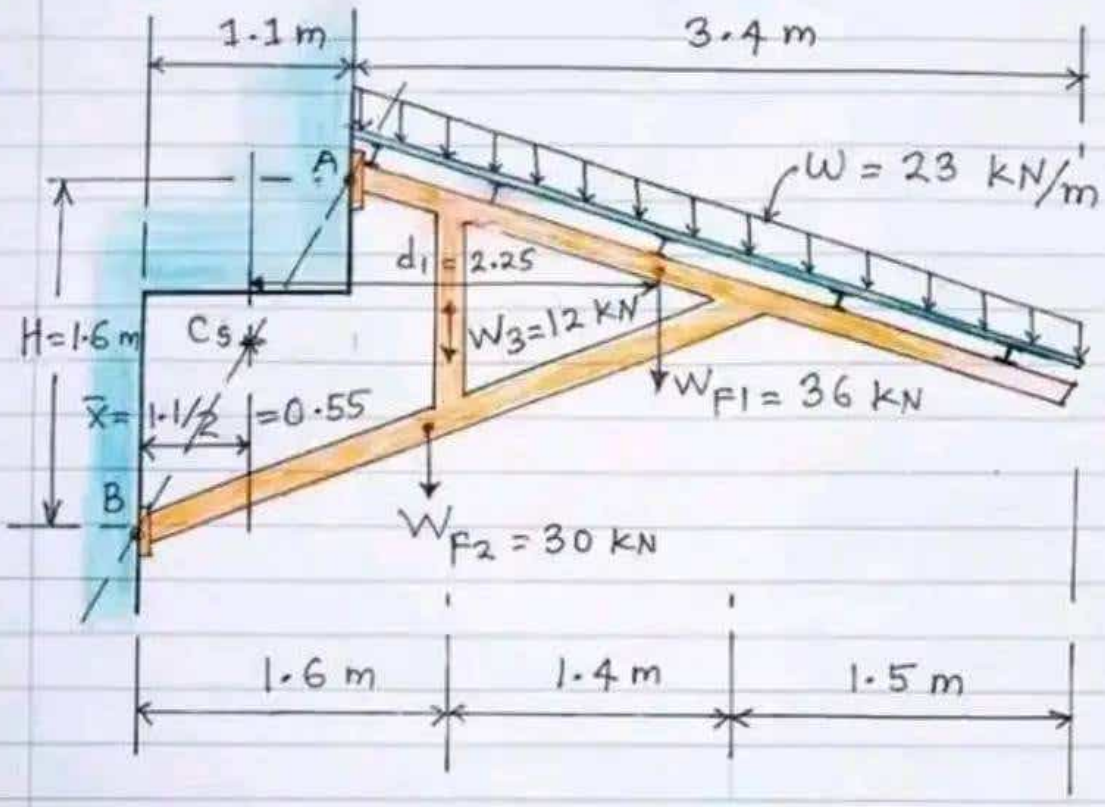
Calculation note book for cantilever roof & canopy.



Calculation of $M_{ro} = \Sigma(W_F \times d)$

Element	W_F	d	M_{ro}
1	36	2.25	81
2	30	0.95	28.5
3	12	1.05	12.6
4	23 x 3.4 = 78.2	2.25	175.95
	$\Sigma Q = 156.200$		$\Sigma M_{ro} = 298.050$

Vertical reaction :-

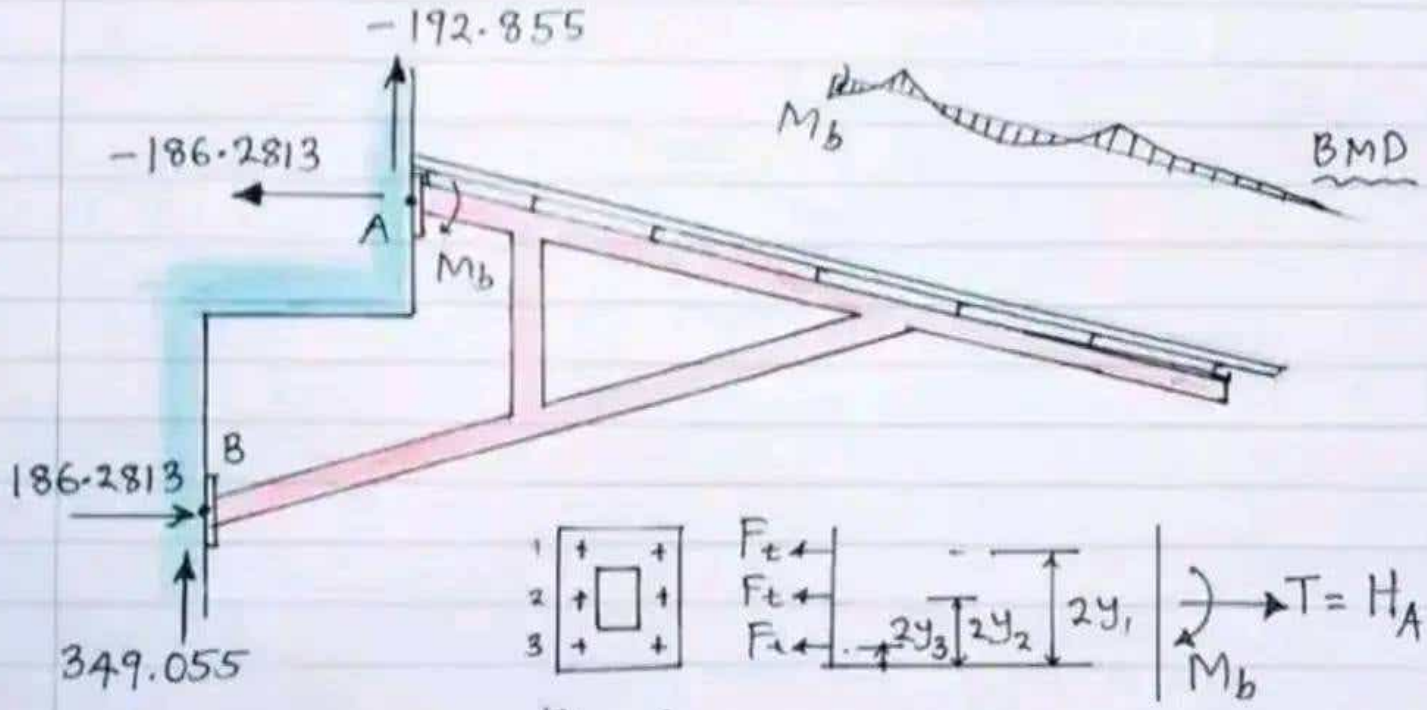
$$V_A = \frac{\Sigma Q}{n_s} - \frac{M_{ro}}{L_s} = \frac{156.2}{2} - \frac{298.05}{1.1} = -192.855 \text{ kN}$$

$$V_B = \frac{\Sigma Q}{n_s} + \frac{M_{ro}}{L_s} = \frac{156.2}{2} + \frac{298.05}{1.1} = 349.055 \text{ kN}$$

Horizontal reaction :

$$H_A = \frac{-M_{ro}}{H} = \frac{-298.05}{1.6} = -186.2813 \text{ KN}$$

$$H_B = +\frac{M_{ro}}{H} = \frac{298.05}{1.6} = 186.2813 \text{ KN}$$



$n_b = 6$

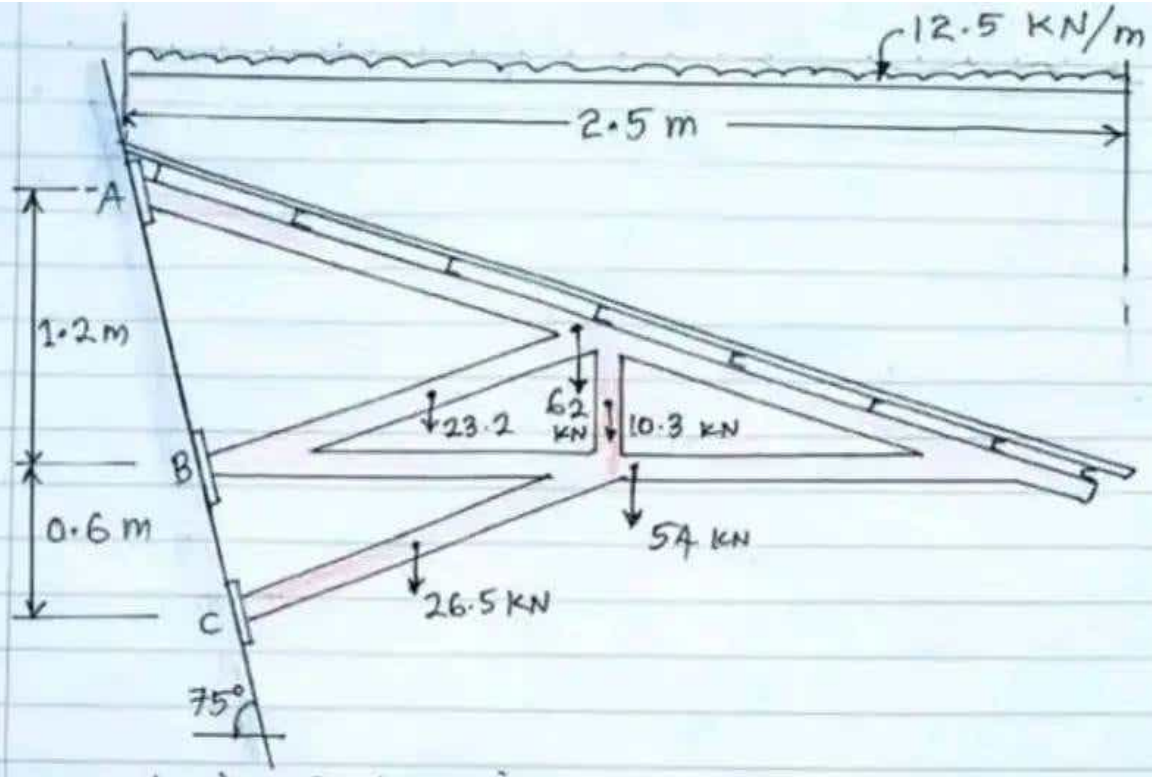
Shear to anchor bolt; $F_s = \frac{349.055}{6}$
at Support B

$\therefore F_s = 58.18$ KN/ bolt.

Tensile Force to anchor bolt (Support A)

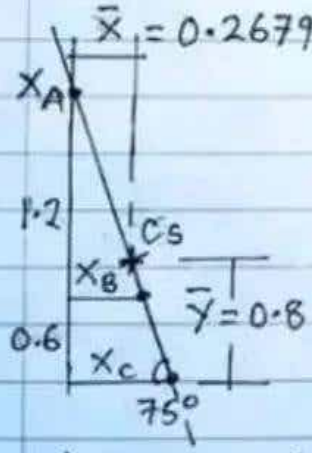
$$F_t = \frac{T}{n_b} + \frac{M_b \cdot y_b}{I_x} \quad \ldots \text{ KN/bolt.}$$

$$I_x = 2y_1^2 + 2y_2^2 + 2 \cdot y_3^2$$



calculation for location of Cs point.

From below; $\bar{y} = \frac{1.8 + 0.6 + 0}{3} = 0.8$ m



$\frac{X_C}{(1.8)} = \text{Tan}(90° - 75°) \therefore X_C = 0.48231$ m

$\frac{X_B}{1.2} = \frac{0.48231}{1.8} \therefore X_B = 0.321539$ m

Distance Support to Cs-axis

$y_A = (1.2 + 0.6) - 0.8 = 1.0$ m

$y_B = 0.8 - 0.6 = 0.2$ m

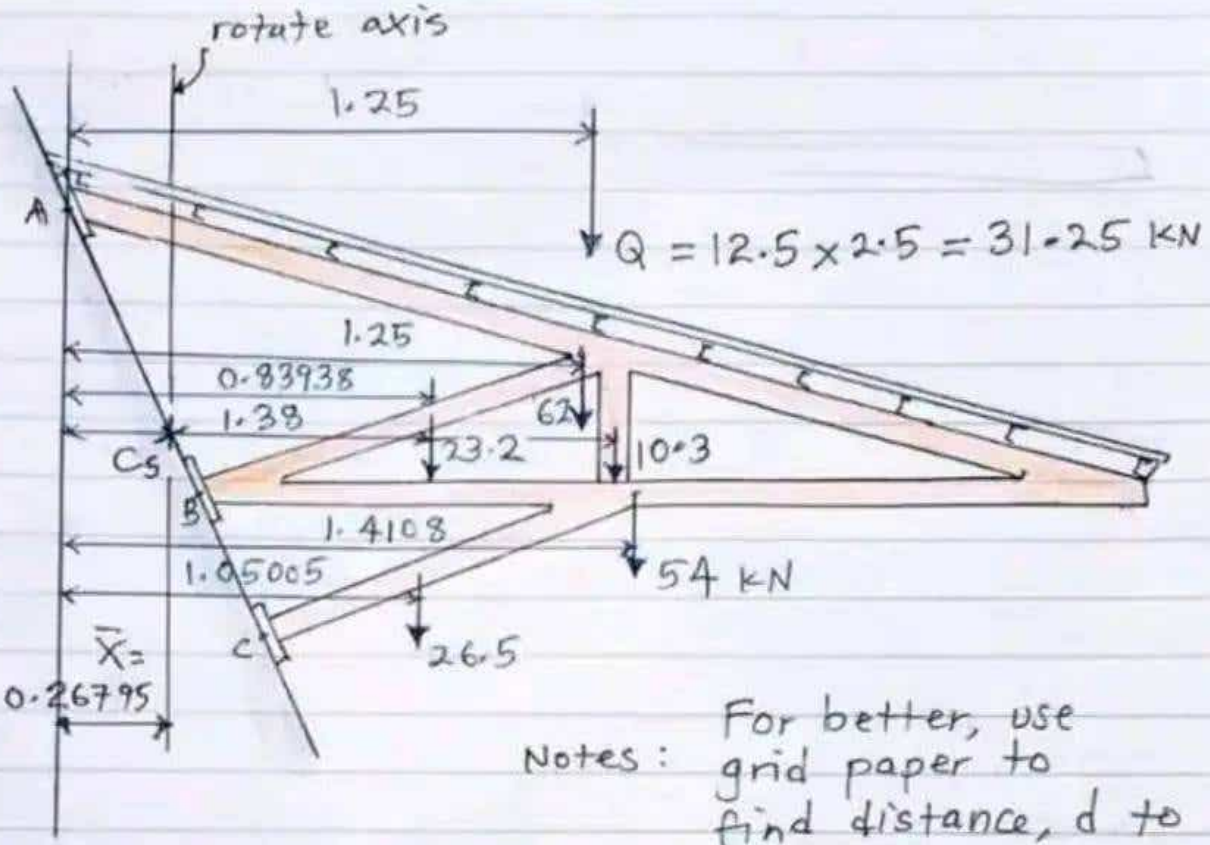
$y_C = 0.8 - 0 = 0.8$ m

$x_A = \bar{x} = 0.26795$ m

$x_B = 0.321539 - 0.26795 = 0.05359$ m

$x_C = 0.48231 - 0.26795 = 0.21436$ m

Rotation Moment, Mro



Notes: For better, use grid paper to find distance, d to Cs-axis.

Element	W	d	Mro
1	31.25	0.98205	30.6891
2	62	0.98205	60.8871
3	10.3	1.11205	11.45412
4	54	1.14285	61.7139
5	26.5	0.57143	15.142895
6	23.2	0.7821	18.14472
	207.25		198.03184 KNM

Total vertical load, $\Sigma Q = 207.25$ KN

Total Moment, $Mro = 198.03184$ KNm

Reaction at support

ΣQ = 207.25 KN
M_{ro} = 199.03184 KNm
ΣF_H = 0 KN

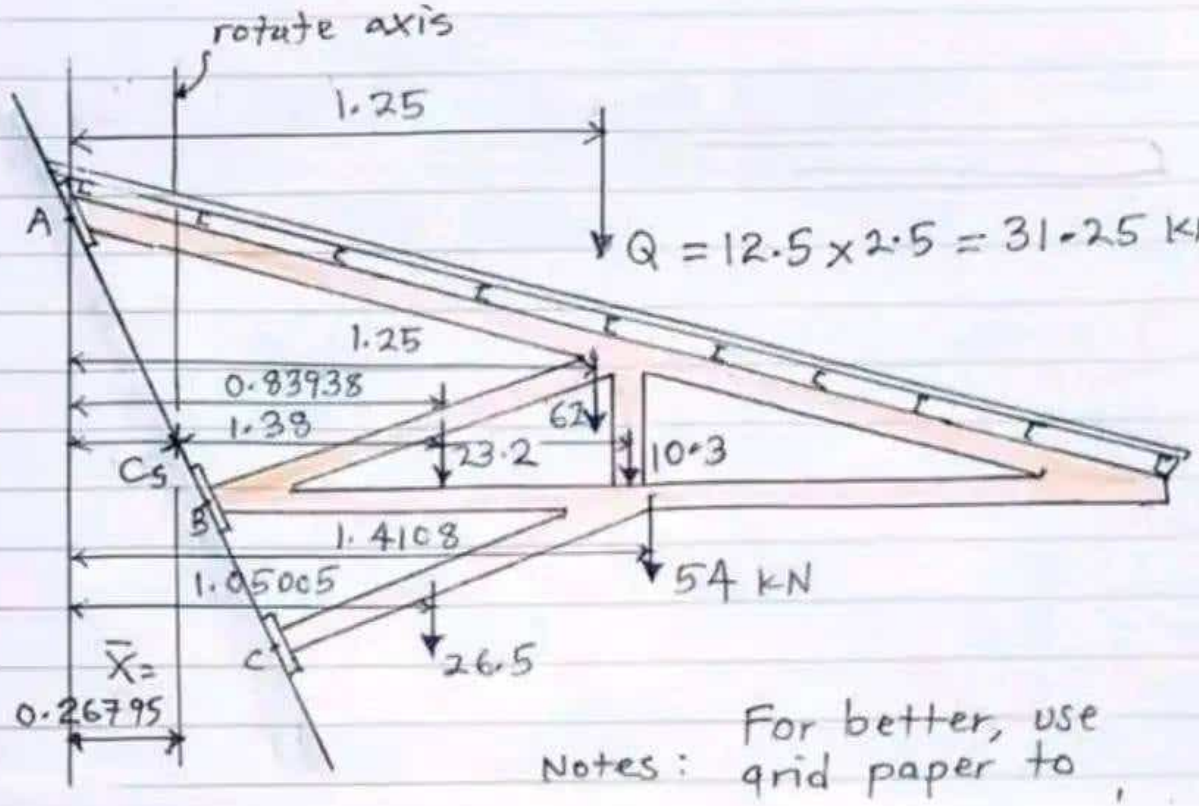
Support	x_n	x^2	y_n	y^2	V_n	H_n
A	-0.26795	0.071797	-1.0	1.0	-370.8324	-120.7511
B	+0.05359	0.0028719	+0.2	0.04	157.0665	24.1502
C	+0.21436	0.04595	+0.8	0.64	421.0590	96.6009
		I_y = 0.12062		I_x = 1.64	207.2500	0.00

(-) Tensile
(+) compression

Vertical reaction, $V_n = \frac{\Sigma Q}{n_s} \pm \frac{M_{ro} \cdot x_n}{I_y}$

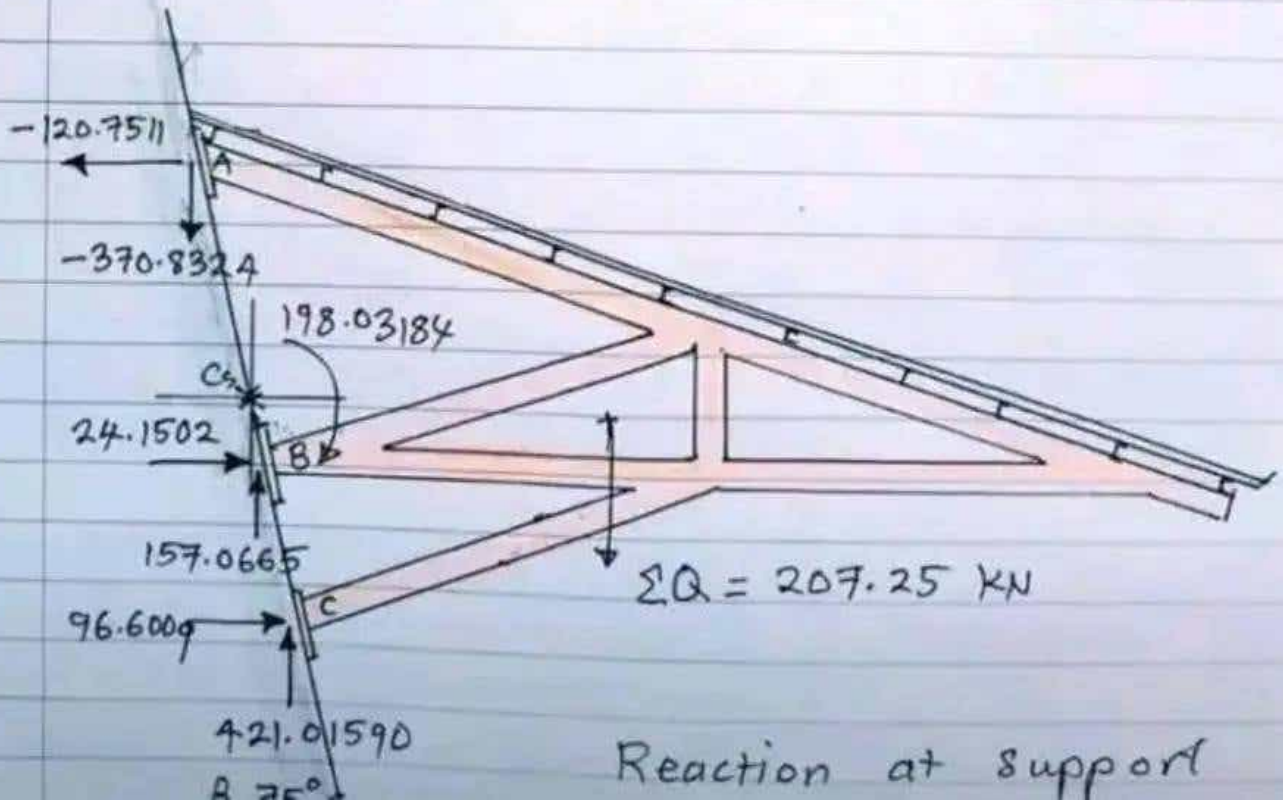
Horizontal reaction, $H_n = \frac{\Sigma F_H}{n_s} \pm \frac{M_{ro} \cdot y_n}{I_x}$

programme this table in microsoft excel.

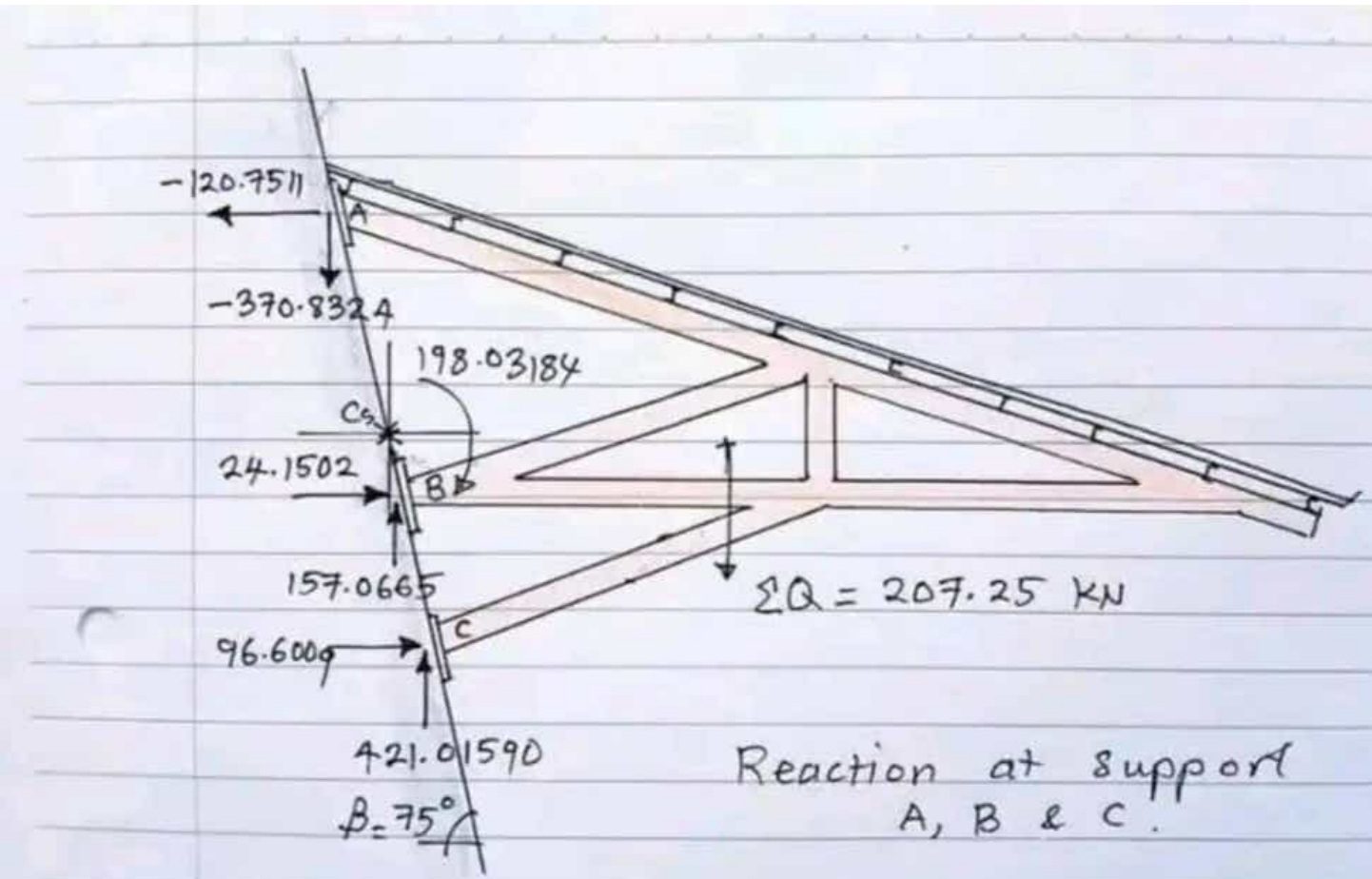


Notes: For better, use grid paper to

No: Date:

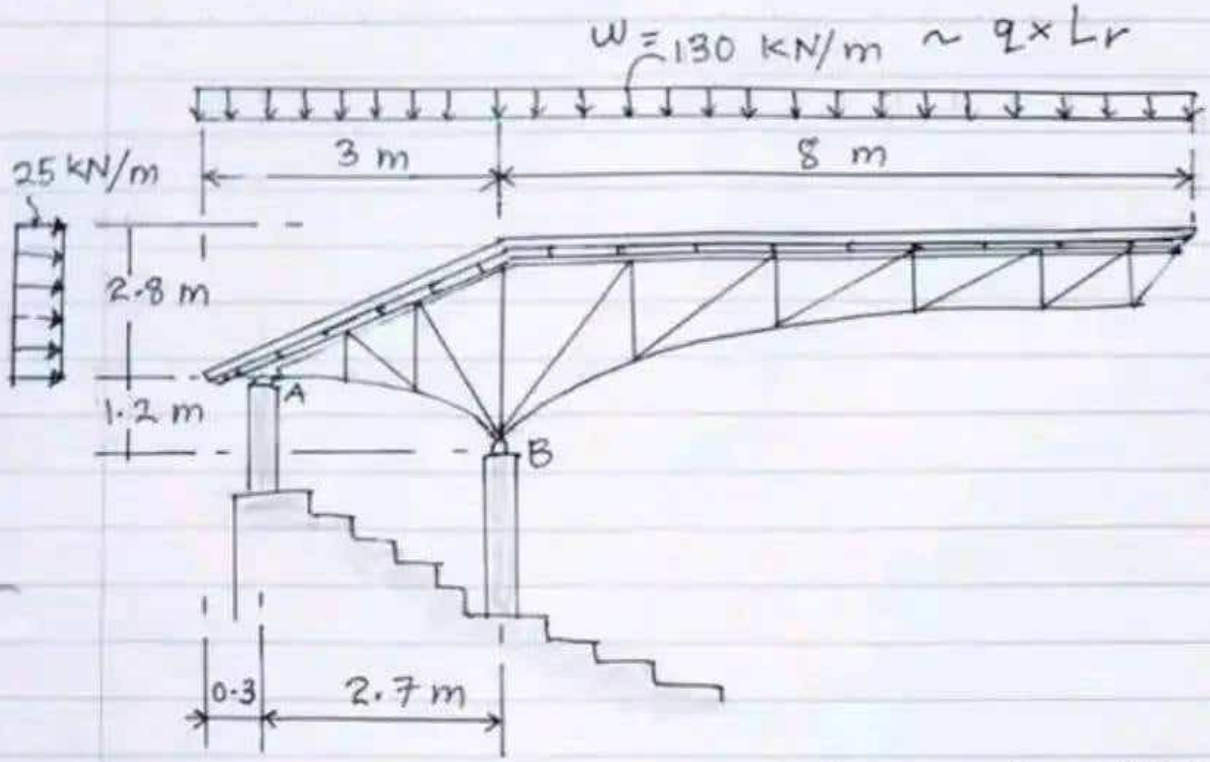


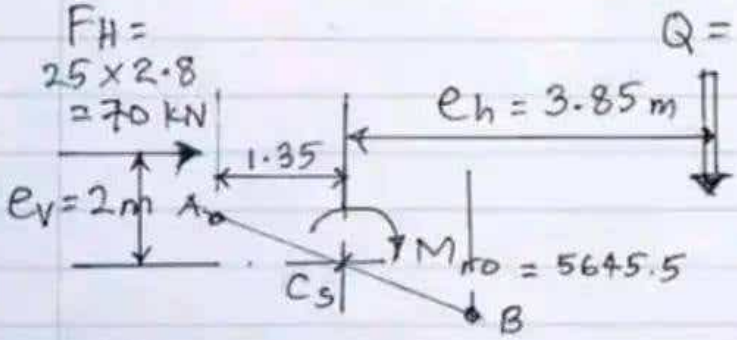
Reaction at support



Reaction at support
A, B & C.

Example 5





Rotation Moment; $M_{ro} = F_H \cdot e_v + Q \cdot e_h$

$= (70 \times 2) + (1430 \times 3.85)$

$\therefore M_{ro} = 5645.5$ kNm

Vertical reaction at column head :-

$$V_A = \frac{Q}{n_s} - \frac{M_{ro}}{L_s} = \frac{1430}{2} - \frac{5645.5}{2.7} = -1375.926 \text{ kN}$$

$$V_B = \frac{Q}{n_s} + \frac{M_{ro}}{L_s} = \frac{1430}{2} + \frac{5645.5}{2.7} = 2805.926$$

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