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Section = B

Subject = Engineering Mechanics

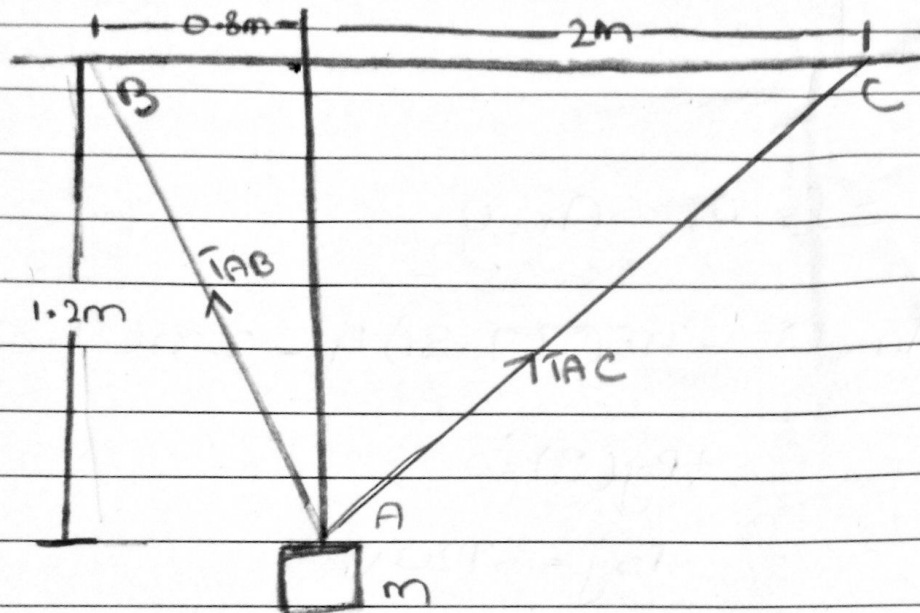
Semester = 2<sup>nd</sup>

Teacher = Engr. Muhammad Majid Naeem

Date: \_\_\_\_\_

①

Q.1) Solution:



$$\alpha = \tan^{-1} \left( \frac{1.2}{0.8} \right)$$

$$= 56.3^\circ$$

$$\beta = \tan^{-1} \left( \frac{1.2}{2} \right)$$

$$= 31.0$$

$$\vec{T}_{AB} = T_{AB} \hat{u}_{AB}$$

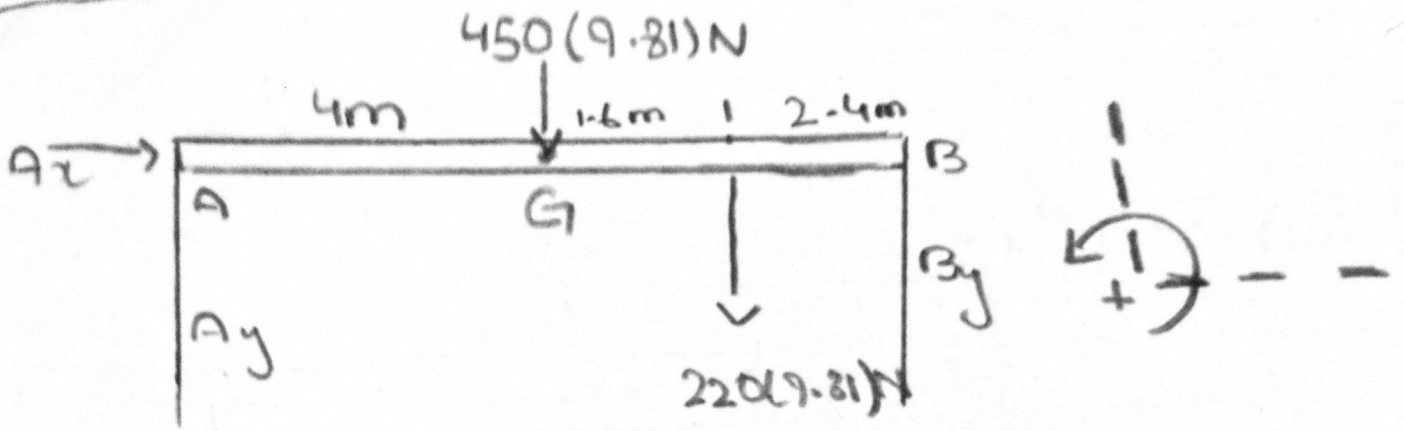
$$= 0.858(60)(9.81) [-\cos 56.3^\circ \hat{i} + \sin 56.3^\circ \hat{j}]$$

$$= -280 \hat{i} + 420 \hat{j} \text{ N}$$

$$\vec{T}_{AC} = T_{AC} \hat{u}_{AC}$$

$$= 0.555(60)(9.81) [\cos 31.0^\circ \hat{i} + \sin 31.0^\circ \hat{j}]$$

$$= 280 \hat{i} + 168.1 \hat{j} \text{ N}$$



From  $\sum F_x = 0, A_x = 0$

$$\sum M_A = 0; -450(9.81)4 - 220(9.81)(5.6)$$

$$+B_y(8) = 0$$

$$B_y = 3720 \text{ N}$$

$$\sum F_y = 0; A_y$$

$$A_y - 450(9.81) - 220(9.81) + 3720 = 0$$

$$A_y = 2850 \text{ N}$$

## Q.2) Solution :

$$\sum F_x = 0$$

$$-360 - 240 \sin \theta + T \sin 30^\circ + 400 \cos 30^\circ = 0 \quad \text{--- (1)}$$

$$\sum F_y = 600$$

$$240 \cos \theta + T \cos 30^\circ + 400 \sin 30^\circ = 600 \quad \text{--- (2)}$$

Numerical solution of equation (1) and (2)

we could eliminate  $T$  between equation (1) and (2) but the resulting equation is still transcendental,

## Q.3) solution :

$$\begin{aligned} \text{Resultant of UDL} &= 300 \text{ lb/ft} \times 4 \text{ ft} \\ &= 1200 \text{ lb} \end{aligned}$$

$$\begin{aligned} \text{Resultant of UDL} &= 400 \text{ lb/ft} \times 4 \text{ ft} \\ &= 1600 \text{ lb} \end{aligned}$$

$$\sum F_x = 0 \quad \text{--- (i)}$$





$$\sum F_y = 0$$

$$R_{1y} + R_{2y} - 1600 - 18000 - 500 - 1200 = 0 \quad \text{--- (ii)}$$

$$\sum M = 0$$

$$(R_{2y} \times 12 \text{ft}) - (1600 \times 2.6) - (1800 \times 7.5) - (500 \times 8.3) - (1200 \times 6) = 0$$

$$12 R_{2y} - 4160 - 135000 - 4150 - 12000 = 0$$

$$12 R_{2y} - 155310 = 0$$

$$12 R_{2y} = 155310$$

$$R_{2y} = \frac{155310}{12}$$

$$R_{2y} = 12942.5 \text{ lb}$$

put the value of  $R_{2y}$  in eq. (ii) we get

$$R_{1y} + (12942.5) - 1600 - 18000 - 500 - 1200 = 0$$

$$R_{1y} + 12942.5 - 21300 = 0$$

$$R_{1y} - 8357.5 = 0$$

$$R_{1y} = 8357.5 \text{ lb}$$