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Paper = Mechanics.

Registered no = 9

Qno1:- (a) Answer:

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

$= 56.3^\circ$.

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

$= 31.0^\circ$.

$T_{AB} = T_{AB} n_{AB} = 0.858(60)(9.81)[-\cos 56.3 i + \sin 56.3 j]$

$= -280i + 420j$ N.

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

$= 280i + 168.1j$ N.

Qno 1 (b) Answer: Solution.

$$\Sigma F_x = 0, \quad A_x = 0$$

$$\Sigma M_A = 0: -450(9.81)4 - 220(9.81)(5.6) + B_y(8) = 0, \quad B_y = 3720\ N.$$

$$\Sigma F_y = 0; \quad A_y - 450(9.81) - 220(9.81) + 3720 = 0$$

$$A_y = 2850\ N$$

Qno 2. Answer. Solution:-

$$\Sigma F_x = 0; \quad -360 - 240\sin\theta + T\sin 30^\circ + 400\cos 30^\circ = 0 \quad (i)$$

$$\Sigma F_y = 600; \quad 240\cos\theta + T\cos 30^\circ + 400\sin 30^\circ = 600 \quad (ii)$$

Numarically Solution of eqn (i) and (ii).

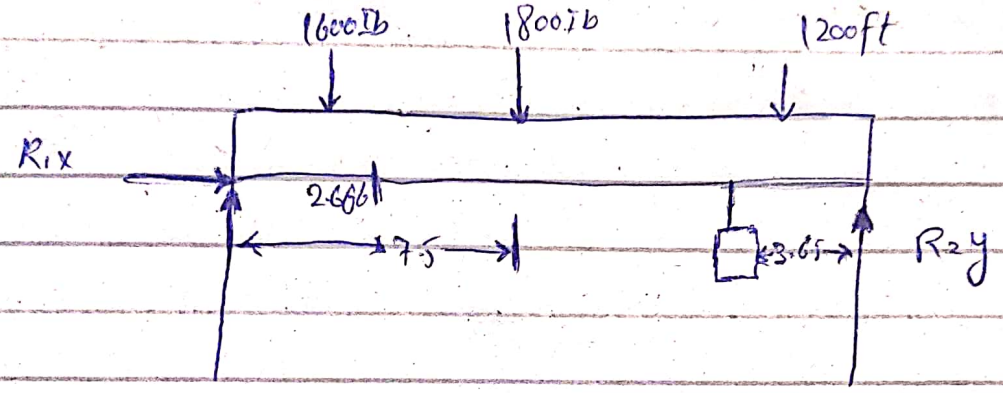
$$\theta = 21.7^\circ, \quad T = 204\ lb$$

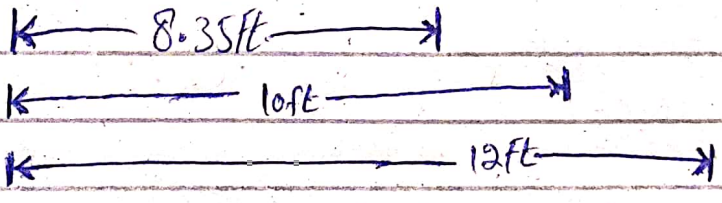
We could eliminate T b/w eqn (i) and (ii) but the resulting equation is still transcendental.

Qno 3: Answer. Solution:

Resulting of UDL = 300 lb/ft × 4 ft = 1200 lb.

Resulting of UVL = $\frac{400\ lb/ft \times 4\ ft}{2}$ = 1600 lb.





$\Sigma F_x = 0$ — (i)

$\Sigma F_y = 0$.

$R_{1y} + R_{2y} - 1600 - 1800 - 500 - 1200 = 0$ — (ii)

$\Sigma M = 0$

$(R_{2y} \times 12\ ft) - (1600 \times 2.6) - (1800 \times 7.5) - (500 \times 8.3) - (1200 \times 10) = 0$

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

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

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

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

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

Put the value of R_{2y} in equation (ii) we get.

$$R_{1y} + (12942.5) - 1600 - 1800 - 500 - 1200 = 0$$

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

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

$$R_{1y} = 8357.5$$

$R_1 x = 0$ $R_{1y} = 8357.5$ Ib $R_{2y} = 12942.5$ Ib

The End :-