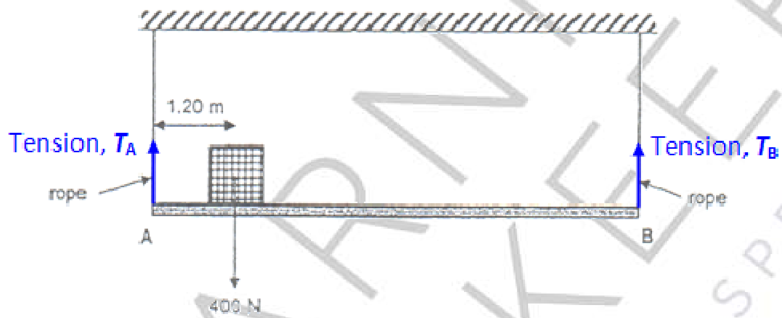
Turning Effect of Forces – Practice 1 { ANS }

Section B

1.



(a) (refer to figure)

(b)

Taking moment about pivot A,

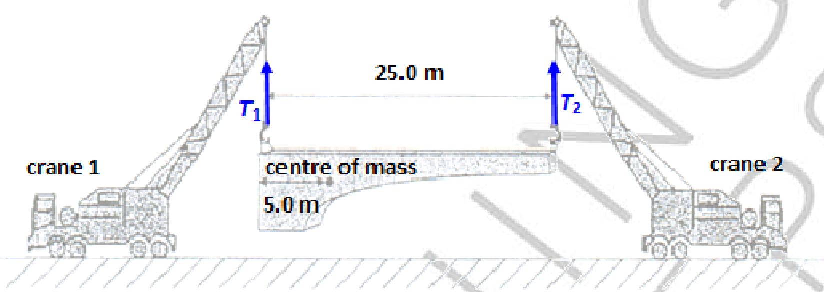
$$\text{↶ } \boldsymbol{moment} = \text{↷ } \boldsymbol{moment}$$
$$T_B \times 4.00\,m = (400\,N \times 1.20\,m) + (600\,N \times 2.00\,m)$$
$$T_B \times 4.00\,m = 480 + 1200$$
$$T_B = 420\,N_{//}$$

(c)

The tension at A passes through pivot A. Thus, the **perpendicular distance** from the tension to the pivot **is zero** {1}. Therefore, the **moment** due to the tension at A is **zero**.

/ 6

2.



(a)

$$W = mg$$
$$= 300000 \times 10$$
$$= 3 \times 10^6 \; N_{//}$$

(b) (refer to figure)

(c)

As usual, apply the principle of moment:
(1) Since this is a 2 pivot scenario, choose 1 Pivot
(2) Find all the Forces that has moment

Taking moment about A,

$$\text{↶ moment by } \mathbf{T_2} = \text{↷ moment by } CG \qquad \{1\}$$
$$\mathbf{T_2} \times 25 = 3 \times 10^6 \times 5$$
$$\mathbf{T_2} = \frac{3 \times 10^6 \times 5}{25}$$
$$\mathbf{T_2} = 6 \times 10^5 \; N_{//} \qquad \{1\}$$

$$\mathbf{T_1} + \mathbf{T_2} = W$$
$$\mathbf{T_1} + 6 \times 10^5 = 3 \times 10^6$$
$$\mathbf{T_1} = 2.4 \times 10^6{}_{//} \qquad \{1\}$$

[Using lateral equilibrium i.e. "$T_1 + T_2 = W$" is simpler than taking moment about the other pivot]

5