



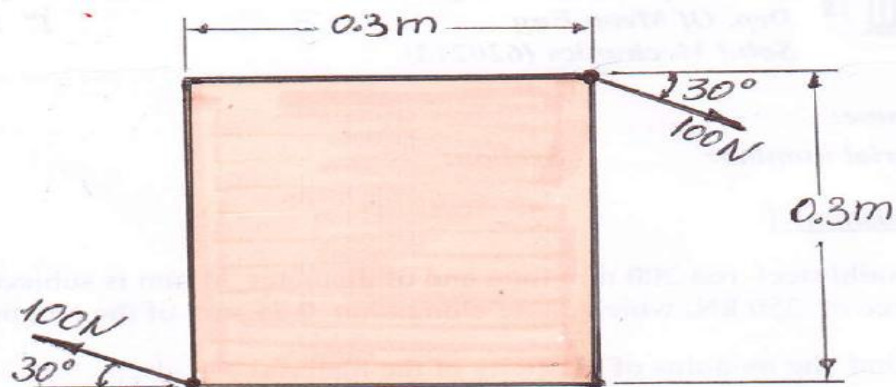
Name:

Serial number: Section:

Question 1

(5 marks)

Determine the resultant couple moment acting on the plate shown in figure.

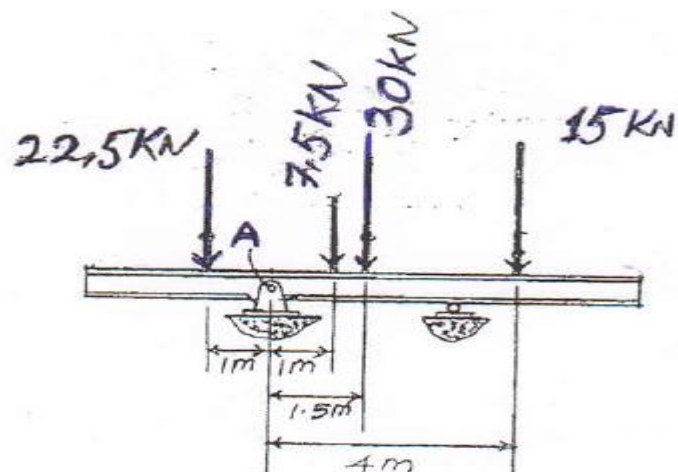


$$\begin{aligned} \sum M_c &= M_{c_1} + M_{c_2} \Rightarrow M_c = -(100 \cos 30^\circ * 0.3) - (100 \sin 30^\circ * 0.3) \\ M_c &= -25.98 - 15 \\ \boxed{M_c} &= \boxed{-40.98 \text{ N.m}} \end{aligned}$$

Question 2

(7 marks)

Replace the concentrating loading by an equivalent resultant force, and specify its location on the beam measured from point A.



$$F_R = 22.5 + 7.5 + 30 + 15 \Rightarrow \boxed{F_R = 75 \text{ kN}}$$

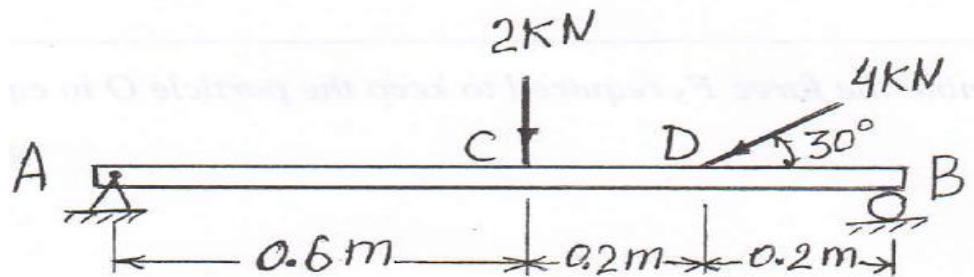
$$\sum M_A = (22.5 \times 1) - (7.5 \times 1) - (30 \times 1.5) - (15 \times 4)$$

$$\boxed{M_A = -90 \text{ N.m}} \Rightarrow d = \left| \frac{M_A}{F_R} \right| = \frac{-90}{75} ; \Rightarrow \boxed{d = 1.2 \text{ m}}$$

Question .3

(8 marks)

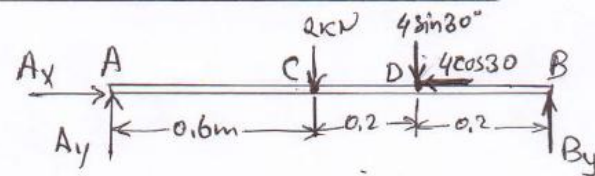
Determine the reaction support at points A and B for the beam loaded as shown in figure.



QUESTION: 3

$$\sum F_x = 0 ; \Rightarrow A_x = 4 \cos 30$$

$$\boxed{A_x = 3.465 \text{ N}}$$



$$\sum M_A = 0 ; \Rightarrow + B_y(1) - 4 \sin 30(0.8) - 2(0.6) = 0$$

$$\boxed{B_y = 2.8 \text{ kN}}$$

$$\sum F_y = 0 ; \Rightarrow A_y - 2 - 4 \sin 30 + 2.8 = 0$$

$$A_y = 2 + 4 \sin 30 - 2.8$$

$$\boxed{A_y = 1.2 \text{ kN}}$$

$$\text{check } \sum F_y = 0 ; \Rightarrow 1.2 + 2.8 - 2 - 4 \sin 30 = 0$$

