



**UNIVERSITI KUALA LUMPUR**  
**Malaysian Institute of Marine Engineering Technology**

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**FINAL EXAMINATION**  
**FEBRUARY 2025 SEMESTER SESSION**

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**SUBJECT CODE** : LMB11902

**SUBJECT TITLE** : STATICS

**PROGRAMME NAME** : BACHELOR OF MARINE ENGINEERING  
(FOR MPU: PROGRAMME LEVEL) TECHNOLOGY WITH HONOURS

**TIME / DURATION** : 2.00 PM - 5.00 PM  
(3 HOURS)

**DATE** : 26 JUNE 2025

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read **CAREFULLY** the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections; Section A and Section B.
4. Answer **ALL** question in Section A, and **THREE (3)** questions **ONLY** in Section B.
5. Please write your answers on this answer booklet provided.
6. Answer **ALL** questions in English language **ONLY**.
7. Formular has been appended for your reference.

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**THERE ARE 8 PAGES OF QUESTIONS, INCLUDING THIS PAGE.**

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**SECTION A (Total: 40 marks)**

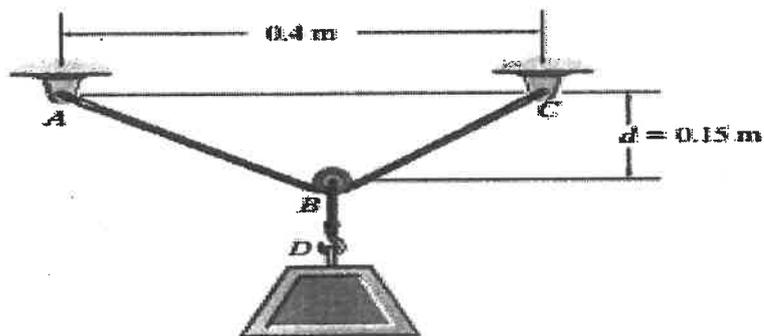
**INSTRUCTION: Answer ALL questions.**  
**Please use the answer booklet provided.**

**Question 1**

With reference to the equilibrium of a particle.

- a) If the 5-kg block is suspended from pulley B and the sag of the cord is  $d = 0.15$  m, determine the force in cord ABC. Neglect the size of the pulley.

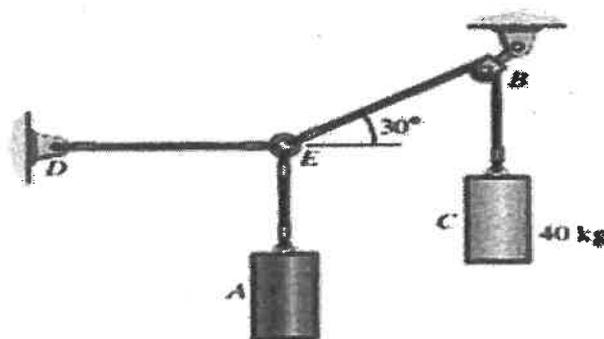
(10 marks)



**Figure 1**

- b) If the mass of cylinder C is 40 kg, determine the mass of cylinder A in order to hold the assembly in the position shown.

(10 marks)



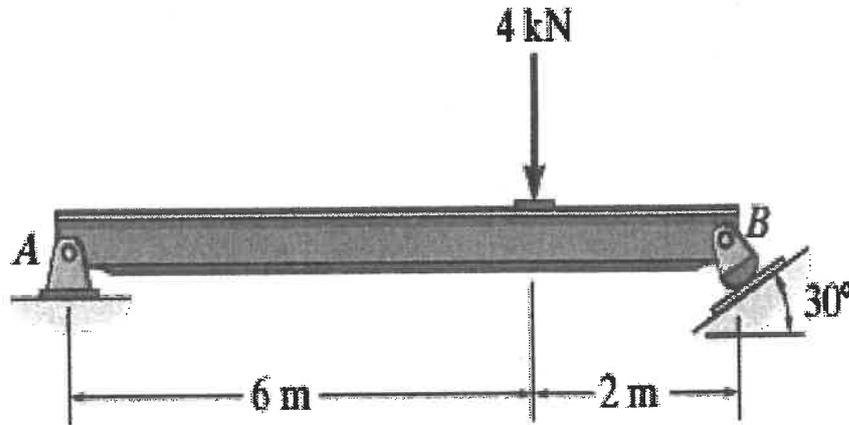
**Figure 2**

**Question 2**

With reference to the equilibrium of a rigid body.

- a) Determine the horizontal and vertical components of the reaction force at pin A and the reaction of the rocker B on the beam. shown in Figure 3.

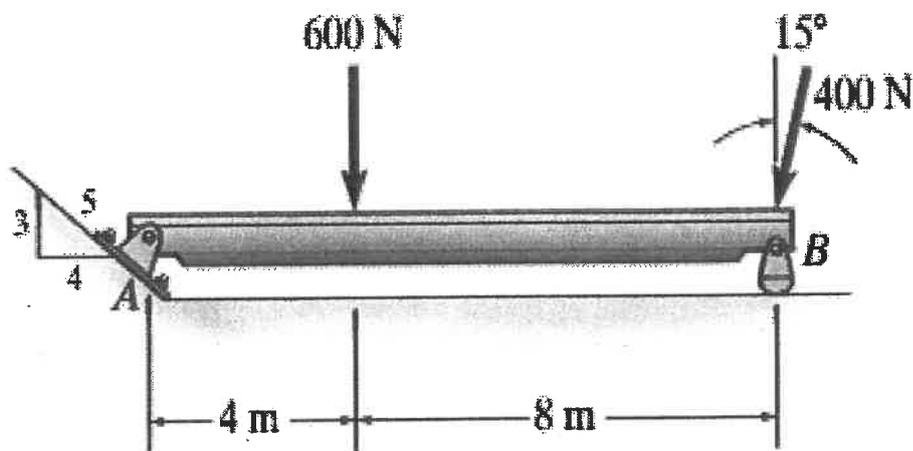
(10 marks)



**Figure 3**

- b) Determine the magnitude of the reactions on the beams at A and B. Neglect the thickness of the beam.

(10 marks)



**Figure 4**

**SECTION B (Total: 60 marks)**

**INSTRUCTION: Answer only THREE (3) questions.**

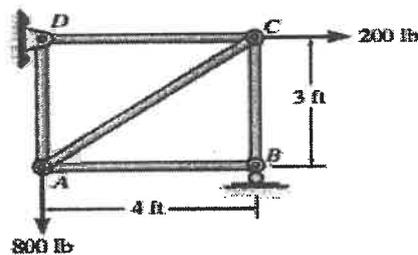
**Please use the answer booklet provided.**

**Question 3**

With reference to the structural analysis

Determine the force in each member of the truss. Given  $D_x = 200$  lb,  $D_y = 650$  lb,  $B_y = 150$  lb. state if the members are in tension or compression.

(20 marks)



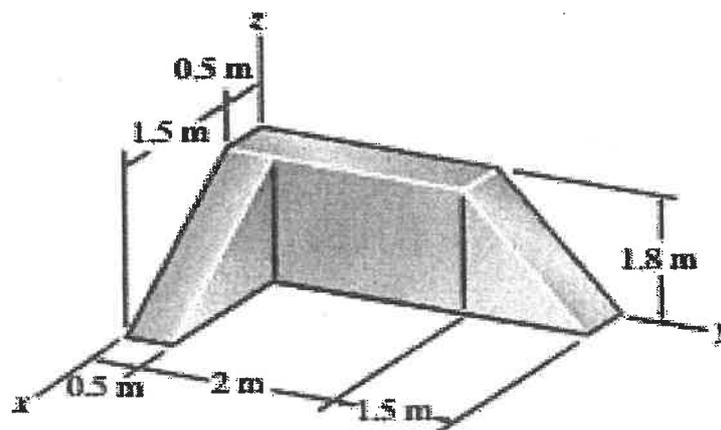
**Figure 5**

**Question 4**

With reference to the center of gravity.

Determine the center of mass  $(\bar{x}, \bar{y}, \bar{z})$  of the homogeneous solid block.

(20 marks)



**Figure 6**

**Question 5**

With reference to internal force.

Determine the normal force, shear force, and moment at point C as shown in figure 7.

(20 marks)

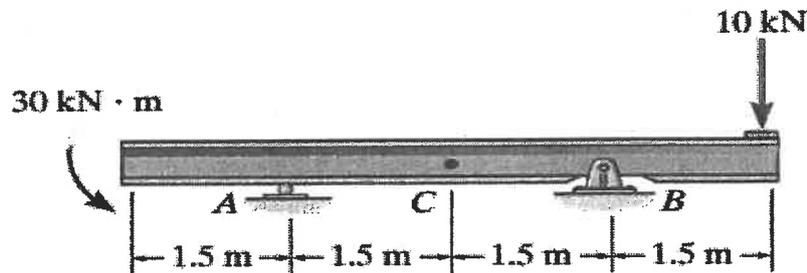


Figure 7

**Question 6**

With reference to internal force:

Determine and draw the shear and bending-moment diagrams for the entire beam and loading as shown in figure 8.

(20 marks)

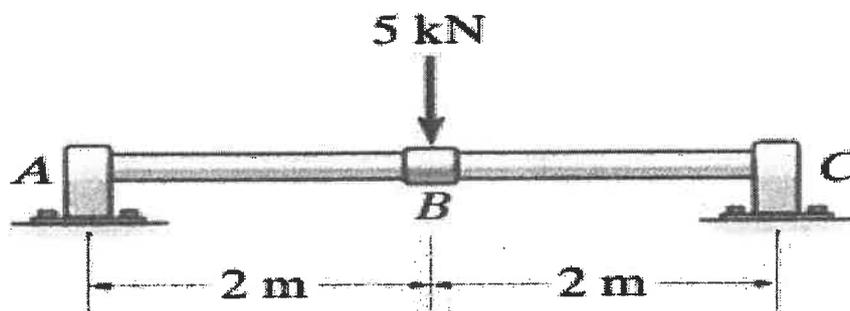


Figure 8

END OF QUESTION PAPER

Appendix: List of formula

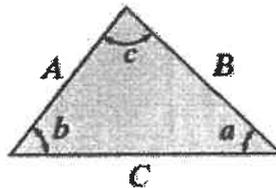
$$\bar{x} = \frac{\sum \tilde{x}A}{\sum A}$$

$$\bar{y} = \frac{\sum \tilde{y}A}{\sum A}$$

$$I = \sum (I + Ad^2)$$

$$k_{x'} = \sqrt{\frac{I_{x'}}{A}}$$

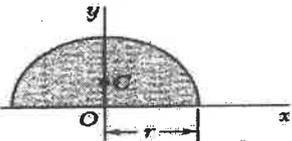
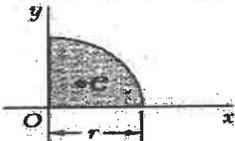
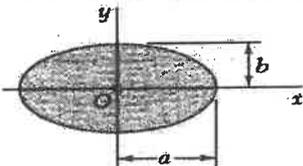
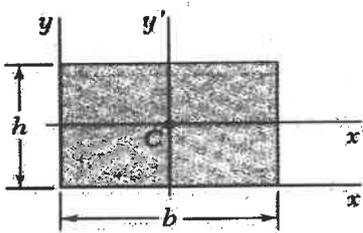
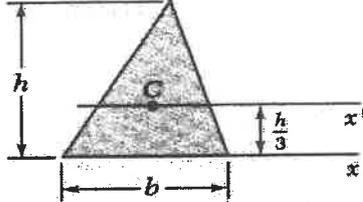
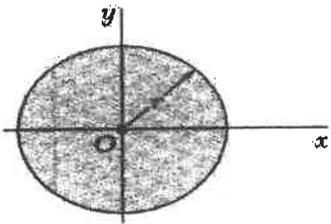
<p><b>Cosine law:</b> <math>C = \sqrt{A^2 + B^2 - 2AB \cos c}</math></p> <p><b>Sine law:</b> <math>\frac{A}{\sin a} = \frac{B}{\sin b} = \frac{C}{\sin c}</math></p>
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$$F_{Rx} = \sum F_x$$

$$F_{Ry} = \sum F_y$$

$$F_R = \sqrt{F_{Rx}^2 + F_{Ry}^2} \quad \text{and} \quad \theta = \tan^{-1} \left| \frac{F_{Ry}}{F_{Rx}} \right|$$

Semicircle		$I_x = I_y = \frac{1}{8} \pi r^4$ $J_O = \frac{1}{4} \pi r^4$
Quarter circle		$I_x = I_y = \frac{1}{16} \pi r^4$ $J_O = \frac{1}{8} \pi r^4$
Ellipse		$\bar{I}_x = \frac{1}{4} \pi a b^3$ $\bar{I}_y = \frac{1}{4} \pi a^3 b$ $J_O = \frac{1}{4} \pi a b (a^2 + b^2)$
Rectangle		$\bar{I}_x = \frac{1}{12} b h^3$ $\bar{I}_y = \frac{1}{12} b^3 h$ $I_x = \frac{1}{3} b h^3$ $I_y = \frac{1}{3} b^3 h$ $J_C = \frac{1}{12} b h (b^2 + h^2)$
Triangle		$\bar{I}_x = \frac{1}{36} b h^3$ $I_x = \frac{1}{12} b h^3$
Circle		$\bar{I}_x = \bar{I}_y = \frac{1}{4} \pi r^4$ $J_O = \frac{1}{2} \pi r^4$

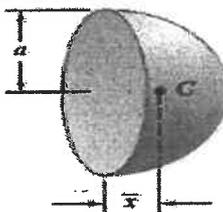
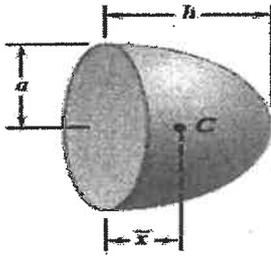
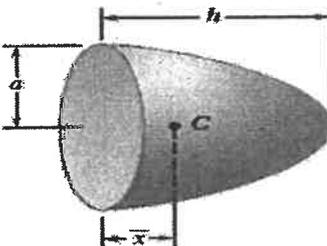
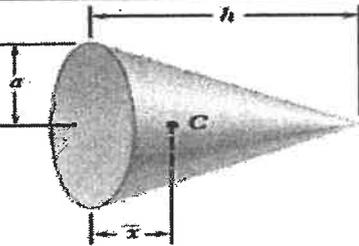
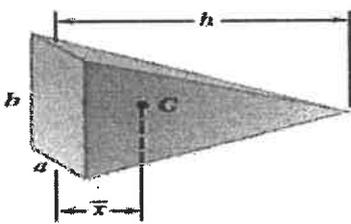
Shape		$\bar{x}$	Volume
Hemisphere		$\frac{3a}{8}$	$\frac{2}{3}\pi a^3$
Semiellipsoid of revolution		$\frac{3h}{8}$	$\frac{2}{3}\pi a^2 h$
Paraboloid of revolution		$\frac{h}{3}$	$\frac{1}{2}\pi a^2 h$
Cone		$\frac{h}{4}$	$\frac{1}{3}\pi a^2 h$
Pyramid		$\frac{h}{4}$	$\frac{1}{3}abh$

Fig. 5.21 Centroids of common shapes and volumes.

