Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

COURSE NAME	:	STATICS
COURSE CODE	:	DAM 13403
PROGRAMME CODE	:	DAM
EXAMINATION DATE	:	JULY / AUGUST 2023
DURATION	:	3 HOURS
INSTRUCTION	:	1. ANSWERS **FIVE (5)** QUESTIONS **ONLY**. 2. THIS FINAL EXAMINATION IS CONDUCTED VIA **CLOSED BOOK**. 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

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Q1 Three forces act on the bracket shown in **Figure Q1**.

(a) Determine the magnitude of the resultant force acting on the bracket and its direction measured counterclockwise from the positive x' axis if $F_1 = 300$ N and $\theta = 10^\circ$.

(8 marks)

(b) If the magnitude of the resultant force acting on the bracket is to be 800 N directed along the positive x' axis, determine the magnitude of F_1 and its direction θ.

(12 marks)

Q2 Three forces act on the bracket shown in **Figure Q2**.

(a) Explain the resultant moments of a system of coplanar forces.

(2 marks)

(b) Determine the resultant moment of the forces about point A. Take F_1=250 N, F_2=300 N and F_3=500 N.

(8 marks)

(c) If the resultant moment of point A is 4800 Nm clockwise, determine the magnitude of F_3 if F_1=300 N and F_2=400 N.

(10 marks)

Q3 The 35 kg pipe is supported at A by a system of five cords as shown in **Figure Q3**.

(a) Explain the condition for the equilibrium of a particle.

(2 marks)

(b) Draw the free body diagram (FBD) for the structure of the ring at A and B.

(4 marks)

(c) Determine the force in each cord of AE, AB, BD and BC for equilibrium.

(14 marks)

Q4 **Figure Q4** shows the part of an airplane's internal structure.

(a) Draw a free body diagram (FBD) of the truss.

(3 marks)

(b) Determine the magnitude of the reaction forces at supports B and F.

(7 marks)

(c) Using the method of section, determine the forces in members BC, BD, and BE of the truss.

(10 marks)

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Q5 (a) Define the Center of Gravity.

(2 marks)

(b) Briefly explain in which condition Centroid coincides with the Center of Gravity.

(3 marks)

(c) Determine the area and centroid of the shaded area in **Figure Q5(c).**

(7 marks)

(d) **Figure Q5(d)** shows a piece of composite plate, determine the centroid of the plate.

(8 marks)

Q6 **Figure Q6** shows three blocks, A, B and C with weights W_B= 20 N and W_C= 80 N. Surface between A and B, $\mu_s = 0.2$ and between B and C, $\mu_s = 0.18$. Between C and the wall $\mu_s = 0.3$

(a) Draw a free body diagram (FBD) of the wedges.

(5 marks)

(b) Determine the normal force between AB and BC.

(10 marks)

(c) Determine the magnitude of force, F needed to start moving block C upward.

(5 marks)

-END OF QUESTIONS –

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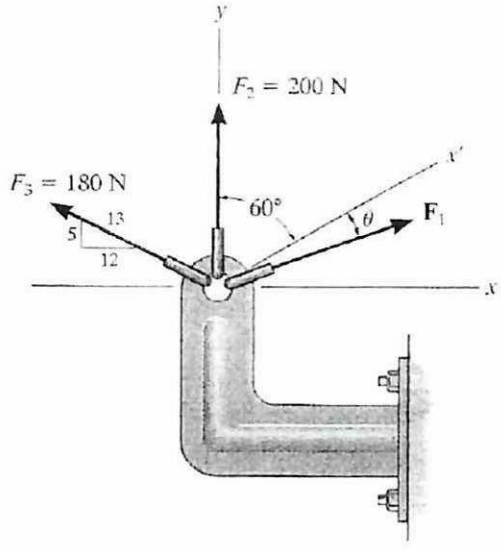

Figure Q1

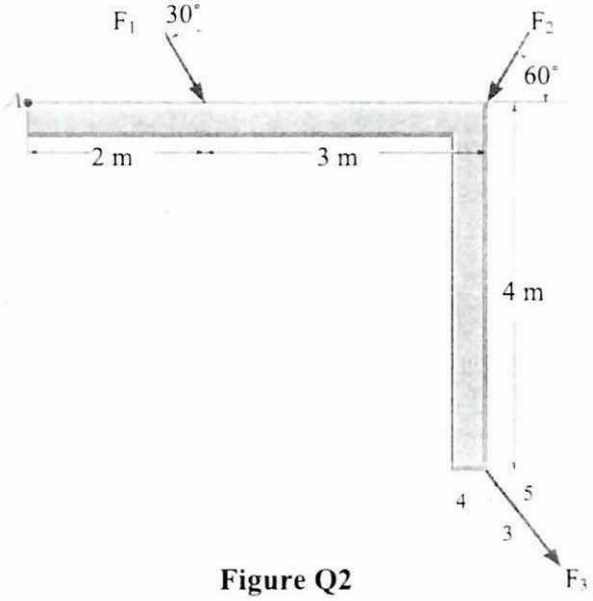

Figure Q2

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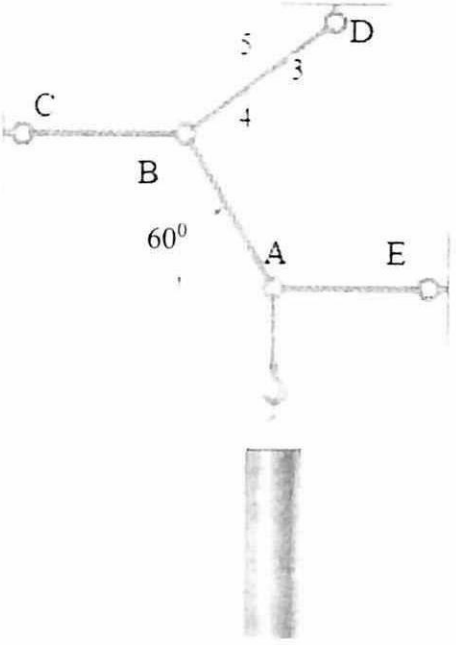

Figure Q3

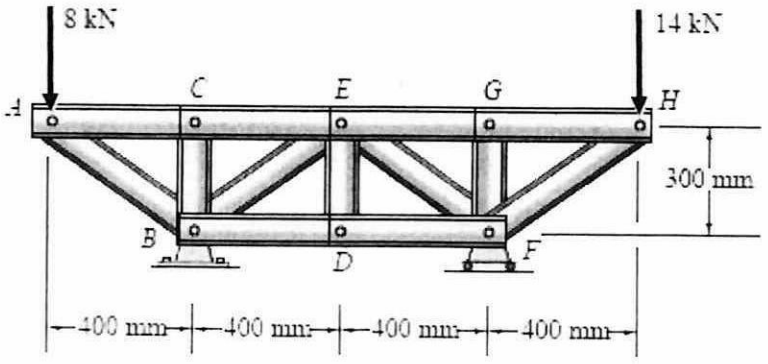

Figure Q4

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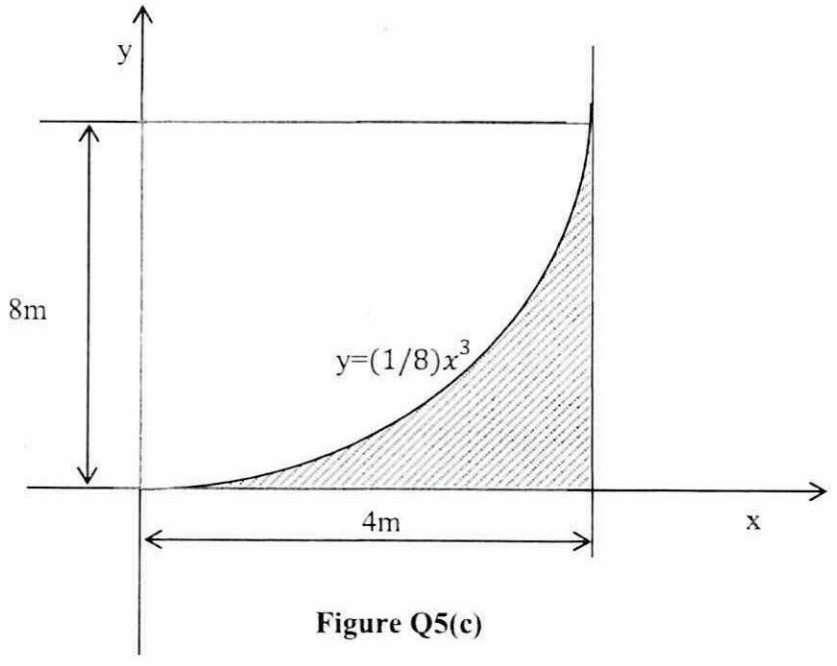

Figure Q5(c)

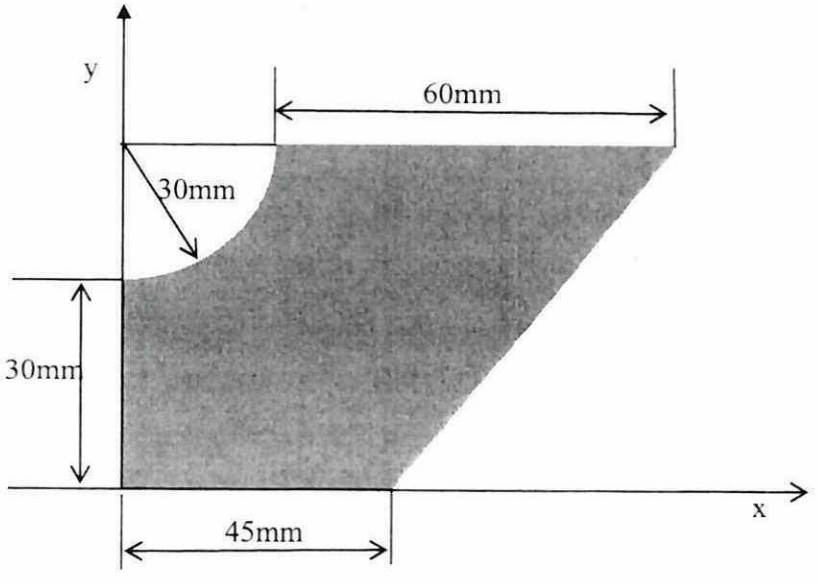

Figure Q5(d)

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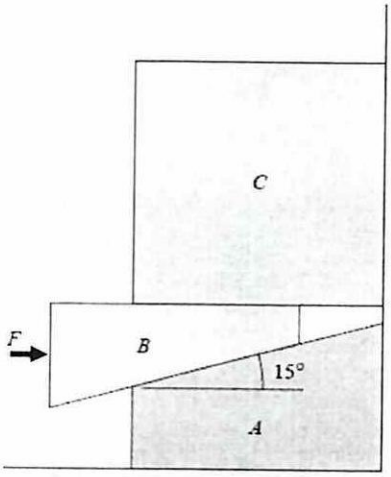

Figure Q6

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