



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021**

COURSE NAME : STATIC AND DYNAMIC
COURSE CODE : DAC 11803
PROGRAMME CODE : DAA
EXAMINATION DATE : JANUARY / FEBRUARY 2021
DURATION : 3 HOURS
INSTRUCTION : **PART A: ANSWER ALL QUESTIONS
PART B: ANSWER TWO (2)
QUESTIONS ONLY**

UPLOAD ANSWERS IN PDF
FORMAT INTO
AUTHOR - INDIVIDUAL ACTIVITIES

THIS QUESTION PAPER CONTAINS TEN (10) PAGES

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PART A

Q1 (a) Explain Newton's first Law. (2 marks)

(b) Evaluate each of the following to **three (3)** significant figures and express each answer in SI units using an appropriate prefix:

(i) $(526 \text{ Mg})(4.36 \text{ mm})$

(ii) $(700 \mu\text{m})(24 \text{ ms})$

(4 marks)

(c) Use the Law of Sines and the Law of Cosines, in conjunction with sketches of the force triangle to solve the followings based on **Figure Q1(c)**.

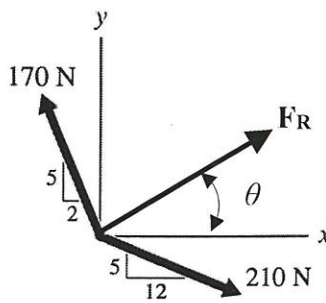


Figure Q1(c)

(i) Determine magnitude of the resultant force F_R . (6 marks)

(ii) Determine the angle θ between the x axis and the line of action of the resultant force. (4 marks)

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- (d) Two forces F_1 and F_2 are the external forces subjected to pin support shown in **Figure Q1(d)**. Based on this figure, find the followings;

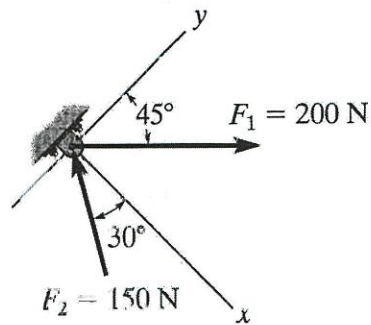


Figure Q1(d)

- (i) Determine the x and y components of F_1 and F_2 . (2 marks)
- (ii) Determine the magnitude of the resultant force and its direction measured counter clockwise from the positive x axis. (7 marks)

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Q2 (a) Define Couple Moment.

(2 marks)

(b) **Figure Q2(b)** shows two couple moments acting on the wood structure. If $F = 2000\text{ N}$, find the followings;

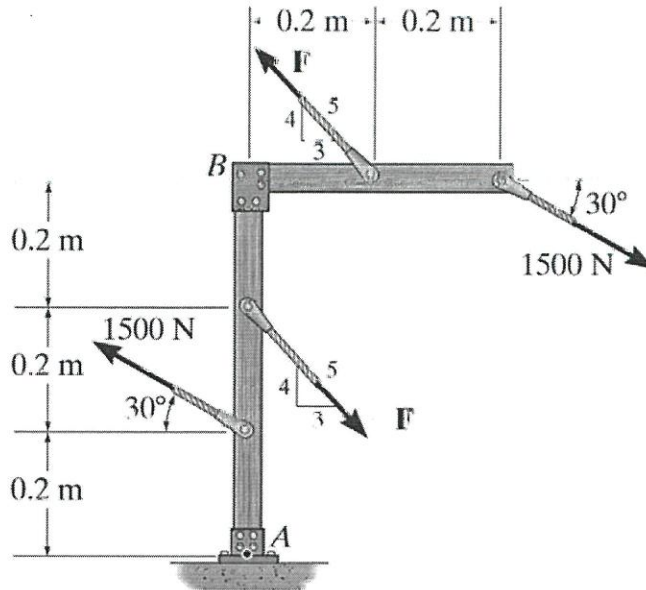


Figure Q2(b)

(i) Determine the equivalent resultant force, F_R .

(8 marks)

(ii) Calculate the equivalent resultant couple moment acting at point A, $(M_R)_A$.
(6 marks)

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- (c) **Four (4)** forces are applied to a plane as shown in **Figure Q2(c)**. Determine the followings;

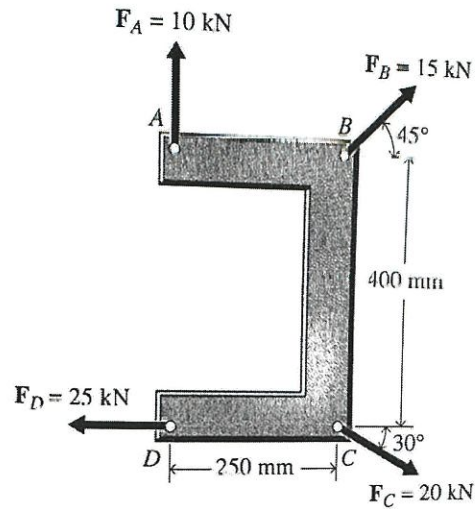


Figure Q2(c)

- (i) The moment of force F_B about point A. (3 marks)
- (ii) The resultant moment produced by the forces about point C. (6 marks)

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PART B

Q3 (a) A beam is loaded and supported as shown in **Figure Q3(a)**. Based on this figure find the followings;

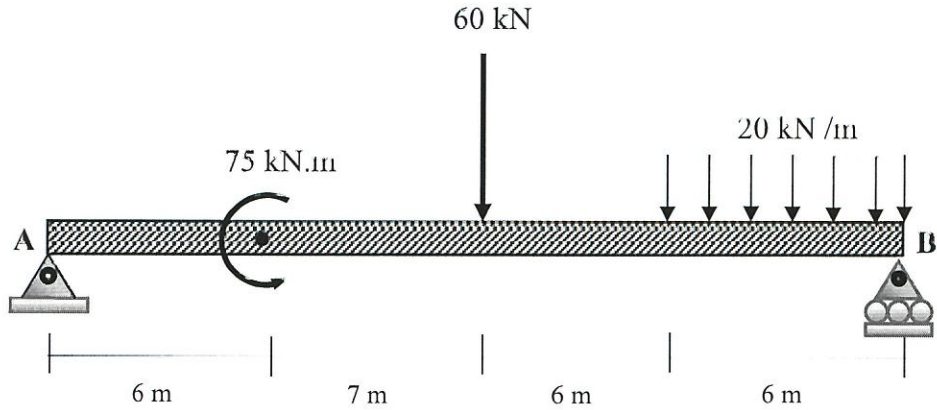


Figure Q3(a)

- (i) Draw the free body diagram (FBD) of the system (2 marks)
 - (ii) Determine the components of the reaction at support A and B. (4 marks)
- (b) A beam is loaded and supported as shown in **Figure Q3(b)**.

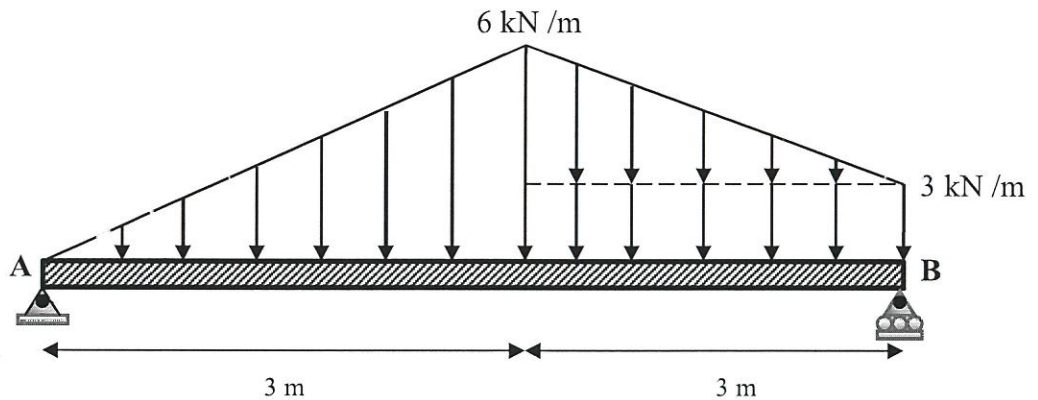


Figure Q3(b)

- (i) Draw the free body diagram (FBD) of the system. (2 marks)
- (ii) Calculate the components of the reaction at support A and B. (4 marks)

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(c) The block in **Figure Q3(c)** weighs 500 N and the coefficient of friction between the block and the floor is 0.2. Based on this info find the followings;

(i) Determine if the system would be in equilibrium force $P = 400$ N (6 marks)

(ii) Calculate the minimum P to prevent motion. (7 marks)

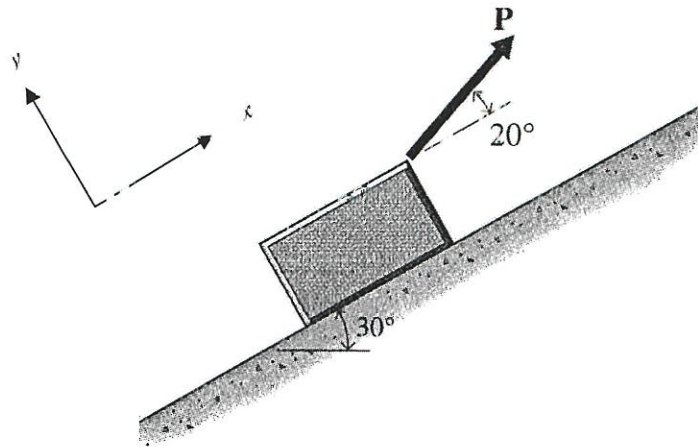


Figure Q3(c)

Q4 (a) Calculate the centroid of the slender rod shown in **Figure Q4(a)**. (6 marks)

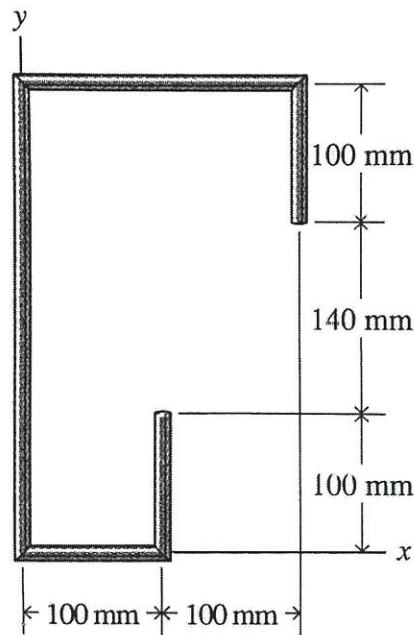


Figure Q4(a)

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- (b) Calculate the centroid of the composite area as shown in **Figure Q4(b)**. (8 marks)

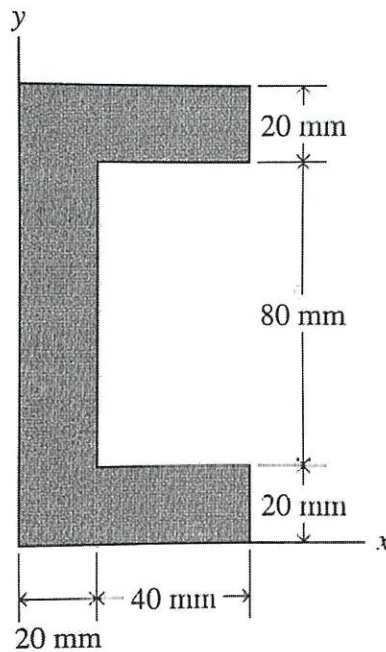


Figure Q4(b)

- (c) Determine the centroid of the shaded area shown in the **Figure Q4(c)**. (9 marks)

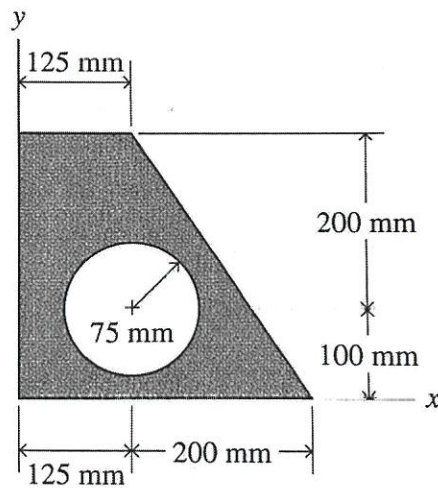


Figure Q4(c)

- (d) Briefly explain about Center of Gravity. (2 marks)

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- (c) **Figure Q5(c)** shows composite area with several shapes. Based on the figure, find the followings;

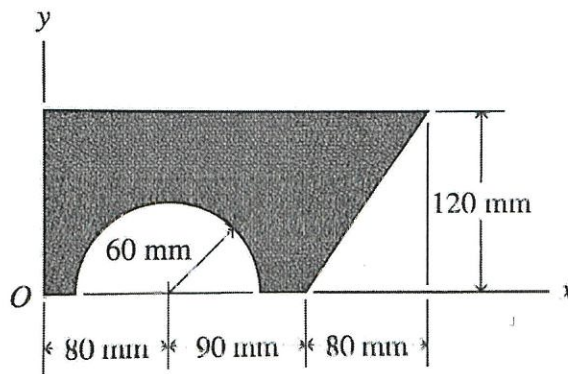


Figure Q5(c)

- (i) Calculate the moment of inertia of the composite area, \bar{I}_x . (2 marks)
- (ii) Calculate moment of inertia, I of the shaded area on the x axis. (6 marks)
- (d) Explain about Parallel Theorem. (2 marks)

- END OF QUESTIONS -

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