UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2008/2009

SUBJECT NAME	:	STATICS AND DYNAMICS
SUBJECT CODE	:	BFC 1022
COURSE	:	1 BFF
EXAMINATION DATE	:	APRIL 2009
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER **ALL** QUESTIONS FROM **PART A** AND **TWO (2)** QUESTIONS FROM **PART B**

THIS PAPER CONSISTS OF TEN (10) PAGES ONLY

PART A

ANSWER ALL QUESTIONS

Q1 (a) Convert the following units to N/mm^2

(i) $180\ lb/ft^2$

(ii) $50\ MN/m^2$

(2 marks)

(b) By using parallelogram method, find the resultant of non-concurrent force system in Figure **Q1(a)**.

(4 marks)

(c) Determine the resultant of the coplanar system in Figure **Q1(b)** using vector component method. Then, verify the result with graphical method.

(12 marks)

(d) Sketch a free body diagram from the front view of structure in Figure **Q1(c)**.

(3 marks)

(e) Briefly describe TWO (2) types of force involved in Figure **Q1(c)**.

(4 marks)

Q2 (a) A force system shows in Figure **Q2(a)** consists of a couple C and four external forces. If the resultant of the system is 25 Nm counterclockwise couple, determine P, Q and C.

(6 marks)

(b) Determine the reactions of a simply supported beam in Figure **Q2(b)**.

(8 marks)

(c) Describe THREE (3) types of support in terms of name, number of reaction and direction with appropriate sketch.

(9 marks)

(d) Based on your opinion, how statics and dynamics help engineers in real practice.

(2 marks)

PART B

ANSWER TWO (2) QUESTIONS ONLY

Q3 (a) List SIX (6) static equilibrium equations for a three dimensions system.
(3 marks)

(b) Determine the centroid of element in Figure **Q3(a)**.
(7 marks)

(c) Three couples acting on a structure as shown in Figure **Q3(b)**. Calculate the moment resultant of the structure.
(10 marks)

(d) Describe the third Newton's Law on motion.
(2 marks)

(e) A student used static equilibrium equations to find reactions for a three dimensional non-concurrent force system in his/her calculations. However, after trying several times without any miscalculations, the problem still can't be solved. Discuss ONE (1) probability mistake did by this student.
(3 marks)

Q4 (a) Sketch ONE (1) example for each parallel, concurrent and non-concurrent force in space with detail dimensions, forces, labels, etc.
(6 marks)

(b) A member of OABC is fixed at O and loaded with 100 N in x-y plane, 50 N in y-axis and 150 N in x-axis as shown in Figure **Q4(a)**. Calculate the reactions at O.
(10 marks)

(c) Describe the first Newton's Law on motion.
(2 marks)

(d) A stone is thrown up with initial velocity of 20 m/s. Determine the maximum peak of stone could be reached from ground surface.
(3 marks)

(e) Based on your opinion, what is the most important, either statics or dynamics to be applied in real practice? Give ONE (1) example in your explanation.
(4 marks)

Q5 (a) Determine the moment of inertia by referring to x-axis (I_{x-x}) for the section in Figure Q5(a).

(9 marks)

(b) A 280 kg of loaded box is supported by several rope and pulley arrangement as shown in Figure **Q5(b)**. Calculate force, T.

(5 marks)

(c) Describe the second Newton's Law of motion.

(3 marks)

(d) If there is a constant towing force of 3 kN, how long (in seconds) would it take if a tug boat trying to tow 10 tones of barge from rest to 30 knot? Given 1 knot = 0.5144 m/s.

(4 marks)

(e) Based on your opinion, do we apply statics or dynamics in our daily lives? Give ONE (1) example.

(4 marks)

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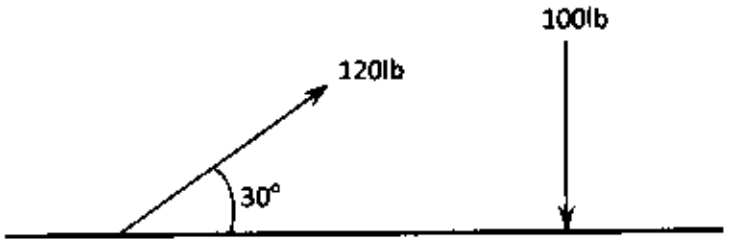

FIGURE Q1 (a)

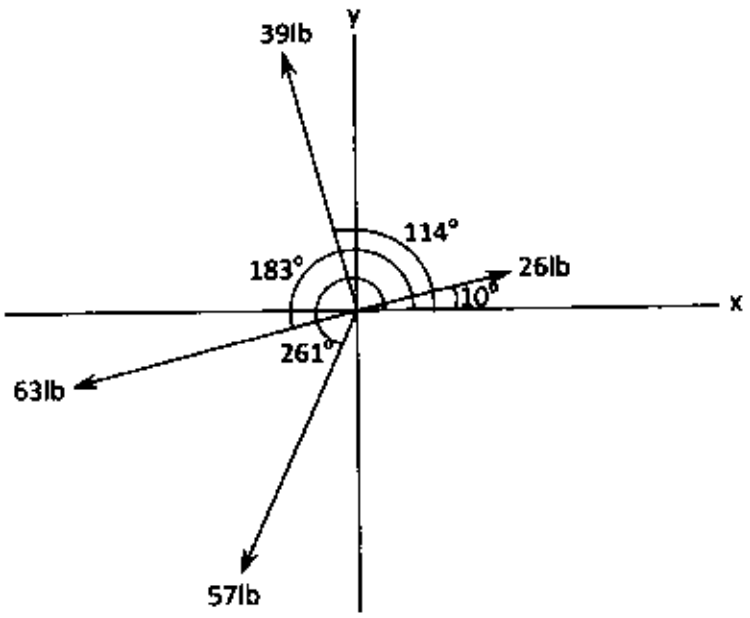

FIGURE Q1 (b)

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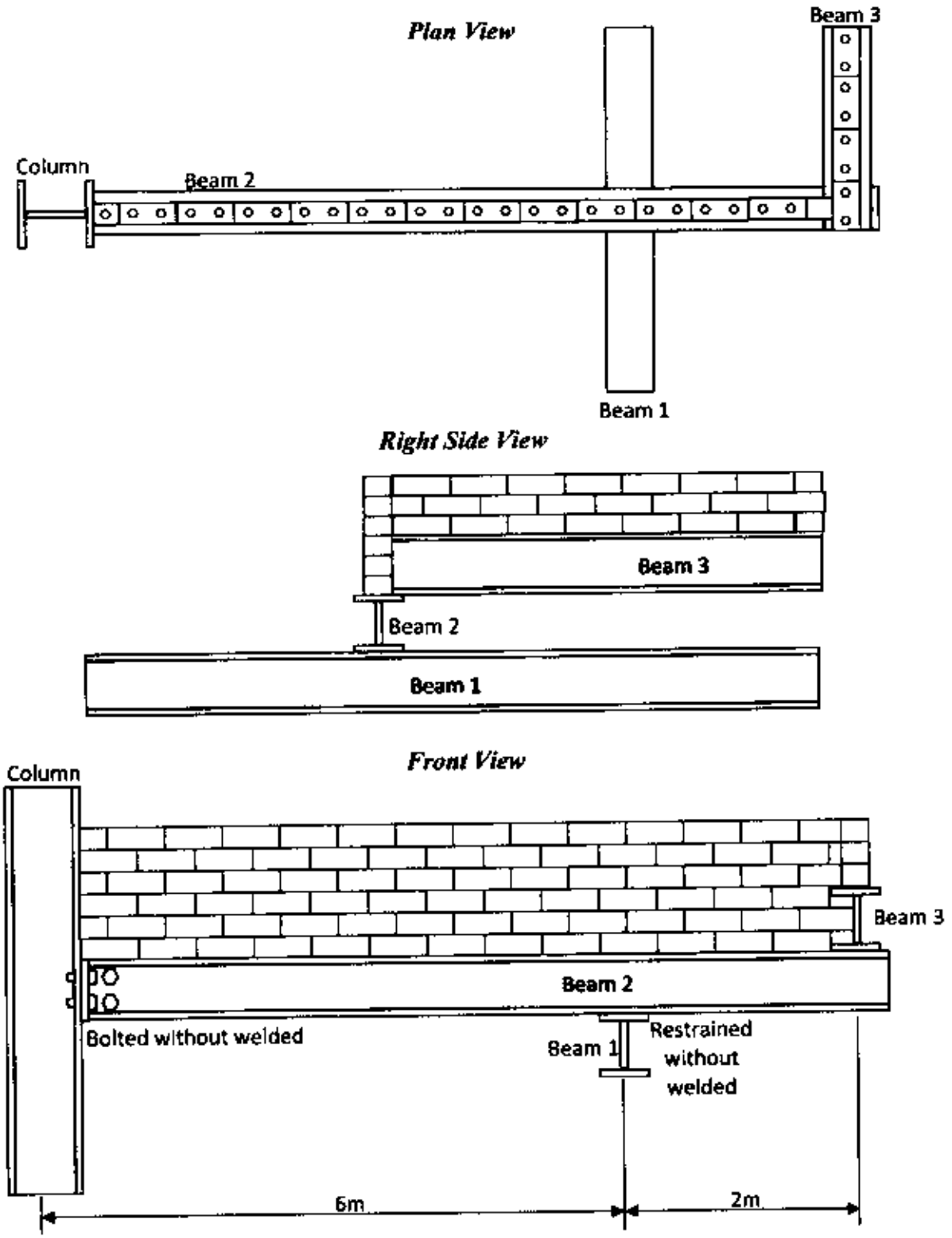

FIGURE Q1 (c)

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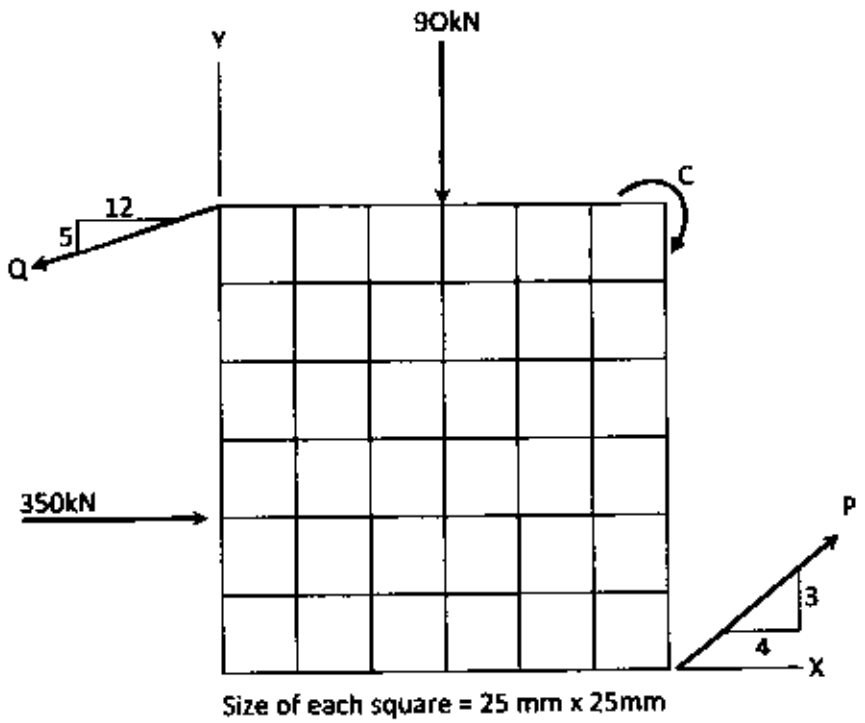

FIGURE Q2 (a)

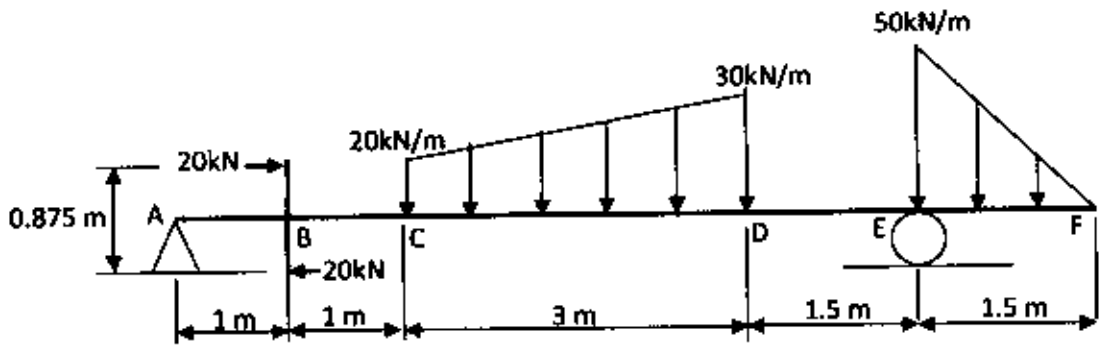

FIGURE Q2 (b)

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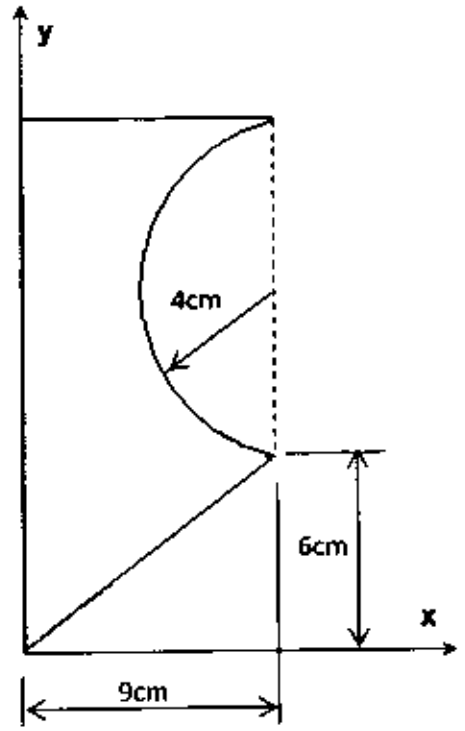

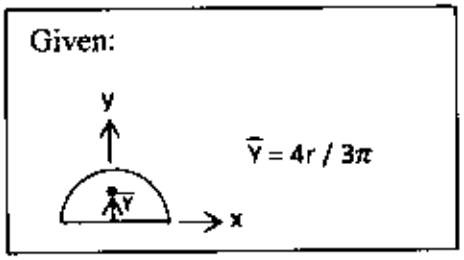

FIGURE Q3 (a)

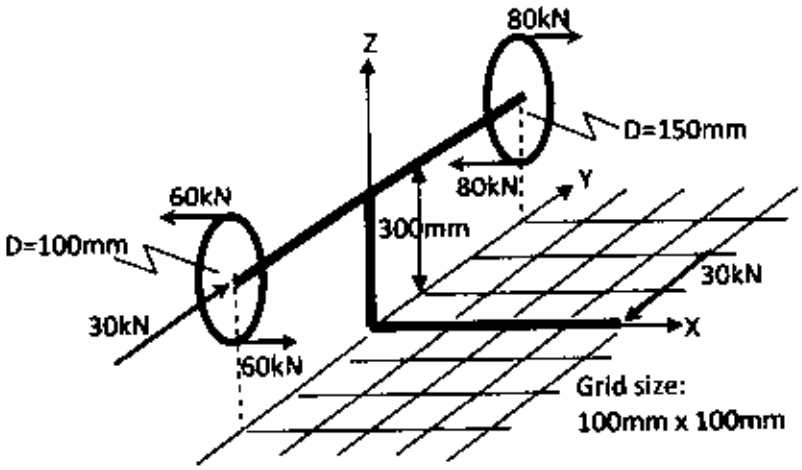

FIGURE Q3 (b)

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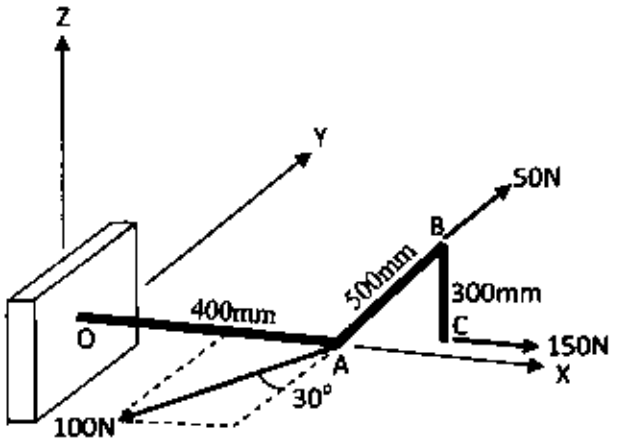

FIGURE Q4 (a)

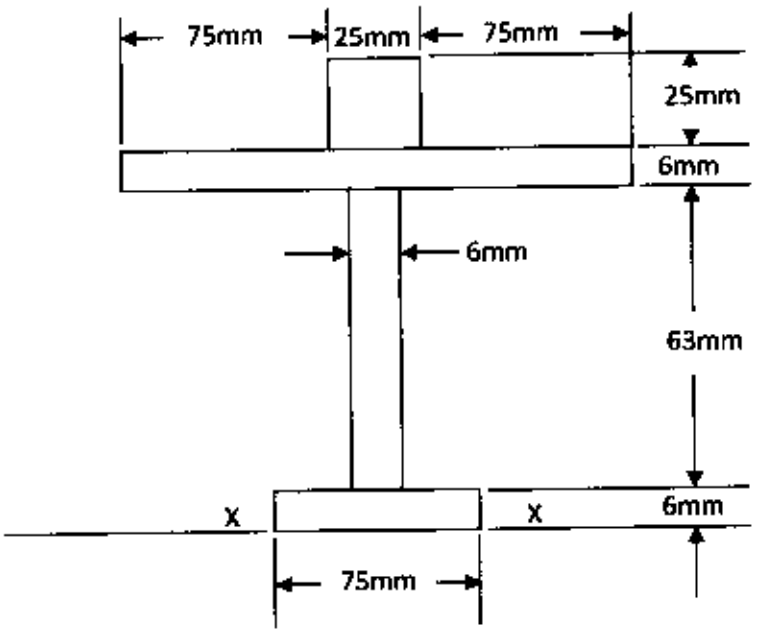

FIGURE Q5 (a)

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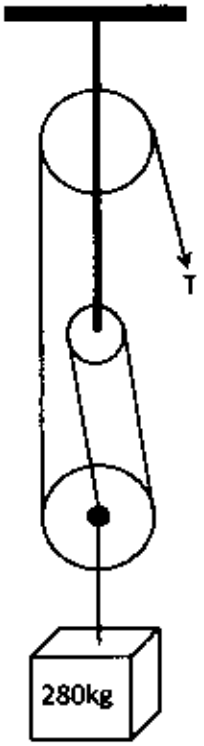

FIGURE Q5 (b)