UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE	:	LGB 12103
COURSE NAME	:	APPLIED MECHANICS
PROGRAMME NAME	:	BACHELOR OF NAVAL ARCHITECURE AND SHIPBUILDING (BNASB)
DATE	:	18 MAY 2016
TIME	:	09.00 AM – 12.00 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read 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 TWO (2) questions in Section A. For Section B, answer THREE (3) question ONLY.
5. Please write your answers on answer sheet provided.
6. Answer all questions in English language ONLY.
7. FORMULA has been appended for your reference.

THERE ARE 8 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer sheet provided.

Question 1

(a) Determine the magnitude of the resultant force acting on the screw eye and its direction measured clockwise from the x axis.

(10 marks)

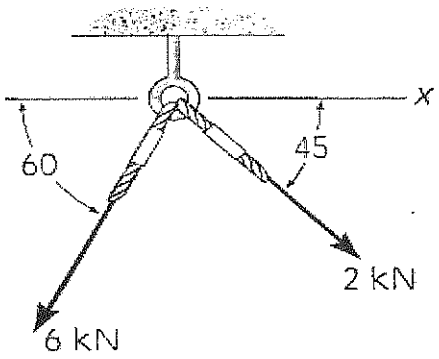


Figure 1

(b) Determine the tension force in cable Ab and BC that the 8 kg lamp is suspended the spring has a stiffness of k_{AB} = 300 N/m.

(10 marks)

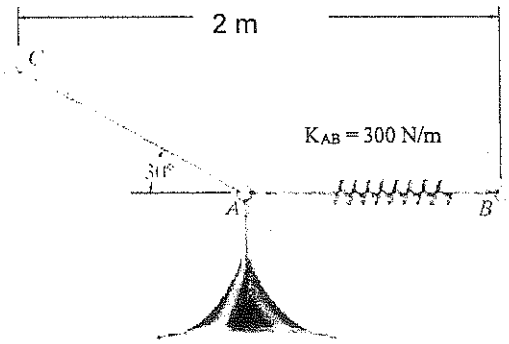


Figure 2

Question 2

(a) Determine the horizontal and vertical components of reaction for the beam loaded in Figure 3. Neglect the weight of the beam in the calculations.

(10 marks)

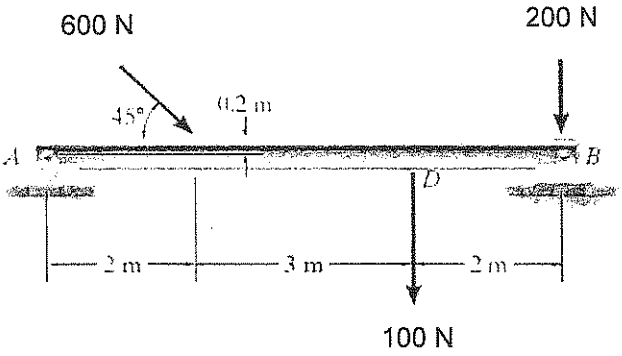


Figure 3

(b) Determine the force in member BC and BA of the truss in Figure 4 and indicate whether the members are in tension or compression.

(10 marks)

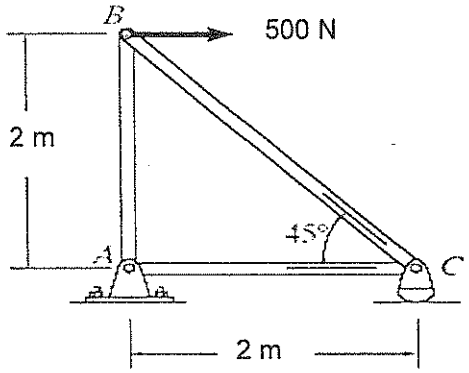


Figure 4

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) question ONLY.
Please use the answer sheet provided.

Question 3

Determine the force in each member of the truss shown in Figure 5 using the method of joints. State whether each member is in tension or compression.

(20 marks)

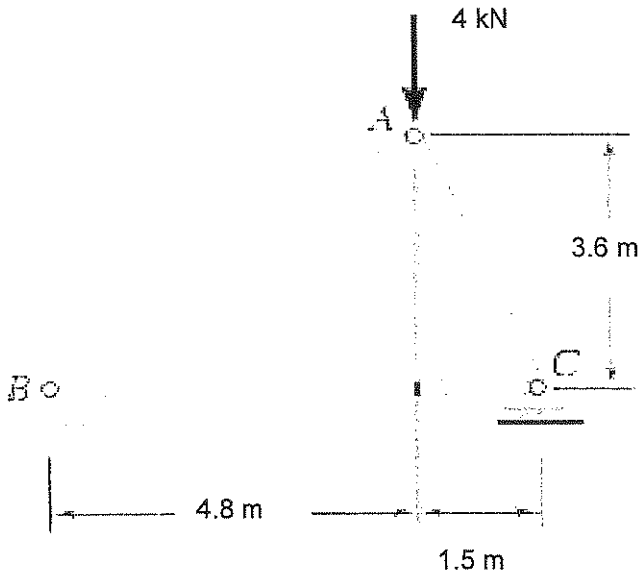


Figure 5

Question 4

Locate the center of mass (x, ȳ, ž) of the homogeneous solid block shown in Figure 6.

(20 marks)

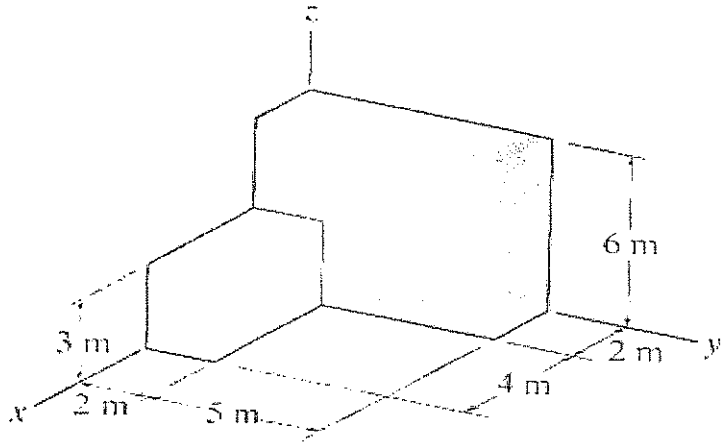


Figure 6

Question 5

Determine the moment of inertia of the cross-sectional area of the T-beam with respect to the X' axis passing through the centroid of the cross section in Figure 7.

(20 marks)

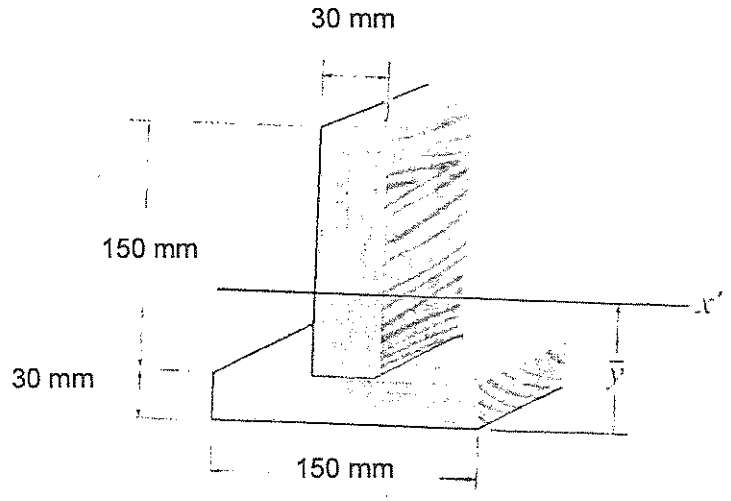


Figure 7

Question 6

Determine the normal force, shear force and moment at point C in loaded beam structure shown in Figure 8.

(20 marks)

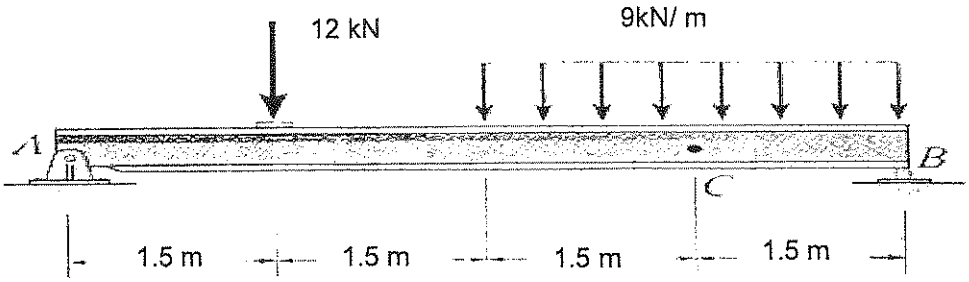


Figure 8

END OF EXAMINATION PAPER

Formulae

$$\bar{x} = \frac{\Sigma \tilde{x} V}{\Sigma V} \quad \bar{y} = \frac{\Sigma \tilde{y} V}{\Sigma V} \quad \bar{z} = \frac{\Sigma \tilde{z} V}{\Sigma V}$$

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

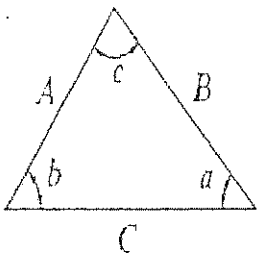
$$\bar{I}_{x'} = \Sigma(\bar{I} + Ad^2)$$

Cosine law:

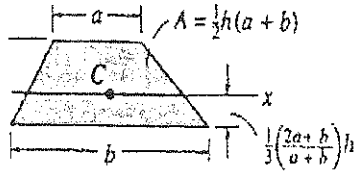
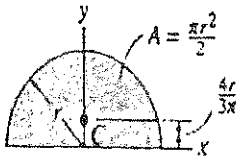
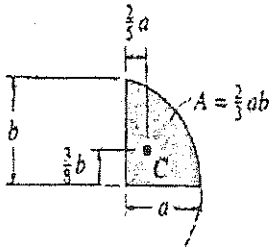
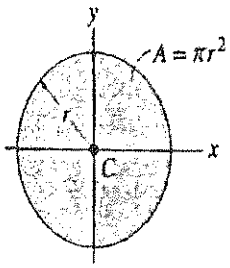
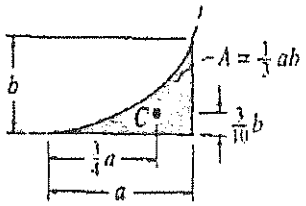
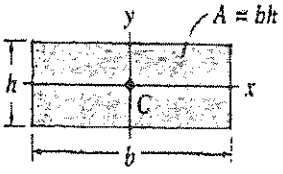
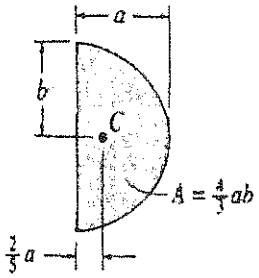
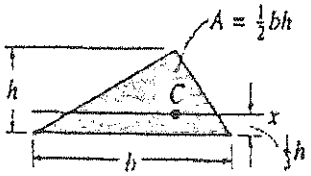
$$C = \sqrt{A^2 + B^2 - 2AB\cos c}$$

Sine law:

$$\frac{A}{\sin a} = \frac{B}{\sin b} = \frac{C}{\sin c}$$



Geometric Properties of Line and Area Elements

Centroid location	Centroid location	Area moment of inertia
Quarter and semicircle arcs	Quarter circle area	
 Trapezoidal area	 Semicircular area	$I_x = \frac{1}{8}\pi r^4$ $I_y = \frac{1}{8}\pi r^4$
 Semiparabolic area	 Circular area	$I_x = \frac{1}{4}\pi r^4$ $I_y = \frac{1}{4}\pi r^4$
 Exparabolic area	 Rectangular area	$I_x = \frac{1}{12}bh^3$ $I_y = \frac{1}{12}hb^3$
 Parabolic area	 Triangular area	$I_x = \frac{1}{36}bh^3$