UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2017 SEMESTER

COURSE CODE	: LGB21703
COURSE NAME	: STATICS
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	: BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN MARINE ENGINEERING
DATE	: 08/07/2017 SAT
TIME	: 9.00 AM - 12.00 PM
DURATION	: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read CAREFULLY the instructions given in the question paper.
2. This question paper has information printed on both sides.
3. This question paper consists of TWO (2) sections; Section A and Section B. Answer ALL questions in Section A and THREE (3) questions from Section B.
4. Please write yours answers on the answer booklet provided.
5. Write your answers only in BLACK or BLUE ink.
6. Answer all questions in English.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer all questions.
Please use the answer booklet provided.

Question 1

A trolley that moves along a horizontal beam is acted upon by two forces as shown in Figure 1.

(a) Knowing that $\alpha = 25°$, determine by trigonometry the magnitude of the force P so that the resultant force exerted on the trolley is vertical.

(8 marks)

(b) What is the corresponding magnitude of the resultant?

(4 marks)

(c) Determine the magnitude and direction of the force P so that the resultant is a vertical force of 2500 N.

(8 marks)

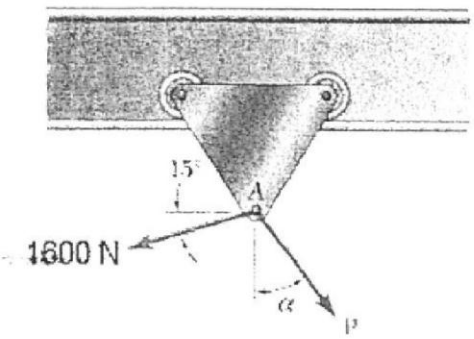


Figure 1

Question 2

The two springs are identical as shown in Figure 2, with un-stretched length 0.4m. When the 50kg mass is suspended at A, the length of each spring increased to 0.6m.

(a) What is the spring constant *k*?

(7 marks)

(b) If the spring AB replaced by the 0.5 m cable length, the spring AC length increased to 0.45 m. What is the spring constant *k* when the angle ABC is 47°?

(10 marks)

(c) What is the tension of AB cable?

(3 marks)

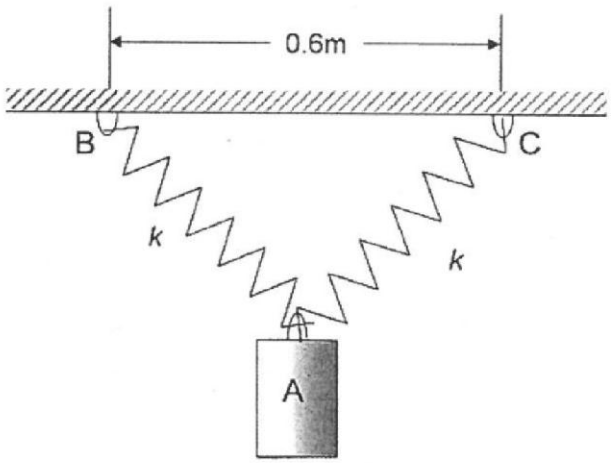


Figure 2

SECTION B (Total: 60 marks)

INSTRUCTION: Select THREE (3) Questions.
Please use the answer booklet provided.

Question 3

The Pratt Bridge Truss supports five forces F = 450 kN as shown in Figure 3. The dimension L = 8 m for respectively trusses.

(a) By perform the method of sections for this structure, calculate the force in member JK and member EK.

(16 marks)

(b) From the information in (a), justify whether the member are in tension or compression?

(4 marks)

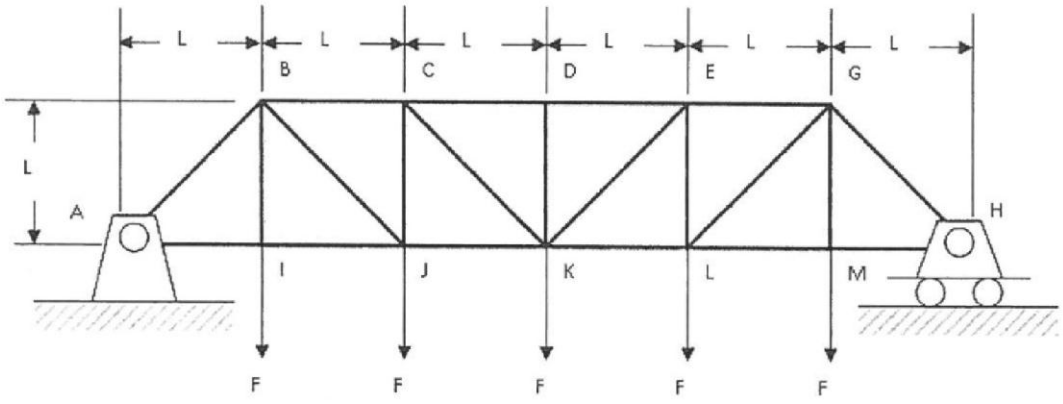


Figure 3

Question 4

The composite plate area with 10 mm thick, has shown in Figure 4 is composed from 2 types of materials which the density of material A is 7850 kg/m^3 and material B is 4850 kg/m^3. Determine the center of gravity for this plate.

(20 marks)

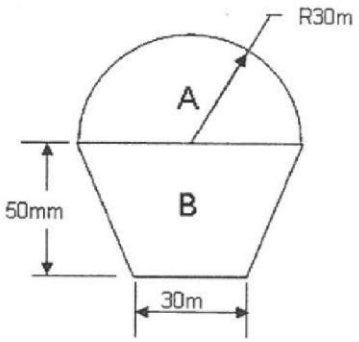


Figure 4

Question 5

The composite area shown in Figure 5 is fabricate from the steel plate. Neglect the weight of the plate. Determine the polar moment of inertia of the area with respect to;

(a) Determine the centroid of area,

(10 marks)

(b) Point-0,

(5 marks)

(c) The centroid of the area.

(5 marks)

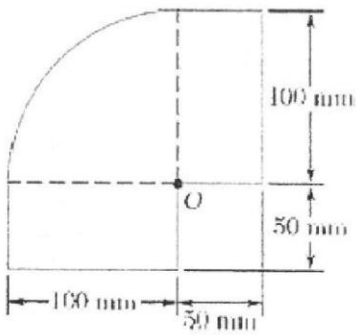


Figure 5

Question 6

A uniform bar of length L and weight ω as shown in Figure 6, is held in equilibrium and support by a pin at A and roller damped at D.

(a) Draw the shear and bending-moment diagrams,

(16 marks)

(b) Determine the maximum absolute values of the shear and bending moment.

(4 marks)

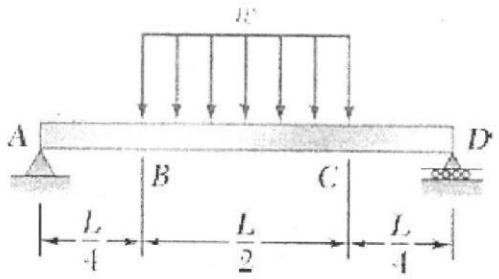
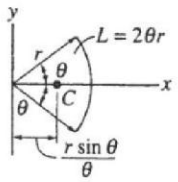
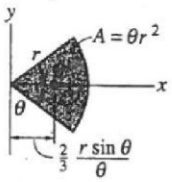
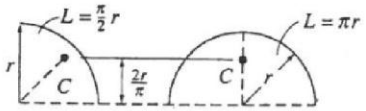
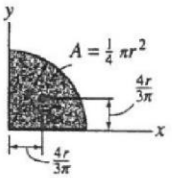
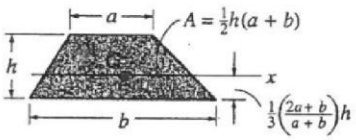
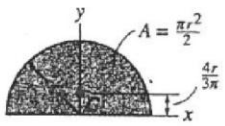
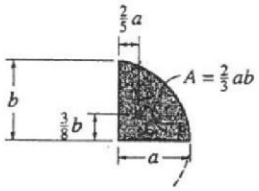
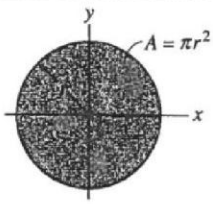
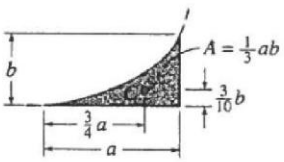
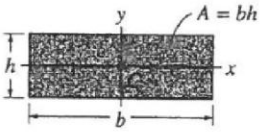
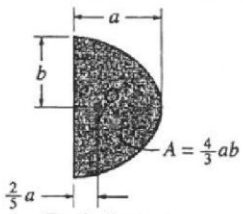
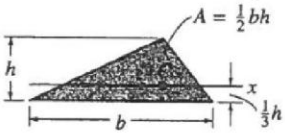


Figure 6

END OF EXAMINATION PAPER

GEOMETRIC PROPERTIES OF LINE AND AREA ELEMENTS (LGB21703 STATICS)

Centroid Location	Centroid Location	Area Moment of Inertia
 Circular arc segment	 Circular sector area	$I_x = \frac{1}{4}r^4(\theta - \frac{1}{2}\sin 2\theta)$ $I_x = \frac{1}{4}r^4(\theta + \frac{1}{2}\sin 2\theta)$
 Quarter and semicircle arcs	 Quarter circle area	$I_x = \frac{1}{16}\pi r^4$ $I_y = \frac{1}{16}\pi r^4$
 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	$I_x = \frac{1}{36}bh^3$