INTI
International College Penang

FINAL
Examination Paper

(COVER PAGE)

Session	:	**April 2019**
Programme	:	Foundation in Science (CFSI)
Course	:	**EGR1203 : ENGINEERING MECHANICS**
Date of Examination	:	2 August 2019 (Friday)
Time	:	8:00AM – 10:00AM Reading Time : Nil
Duration	:	2 hours
Special Instructions	:	

This paper consists of **FIVE (5)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Answer Booklet

Examiner(s)	:	**Dr. Aaron Edward Teo**
Moderator	:	**Assoc. Prog. Dr. Khoo Bee Ee**

This paper consists of 6 printed pages, including the cover page.

INTI INTERNATIONAL COLLEGE PENANG
FOUNDATION IN SCIENCE (CFSI)
EGR1203: ENGINEERING MECHANICS
FINAL EXAMINATION: APRIL 2019 SESSION

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Question 1

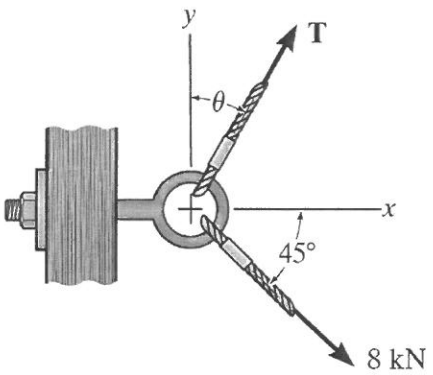

Figure 1

a) If θ = 60° and T = 6 kN, determine the magnitude of the resultant force acting on the eyebolt and its direction measures clockwise from the positive x axis. Refer to Figure 1.

[8 marks]

b) If the magnitude of the resultant force is to be 9 kN directed along the positive x axis, determine the magnitude of force T acting on the eyebolt and its angle θ. Refer to Figure 1.

[8 marks]

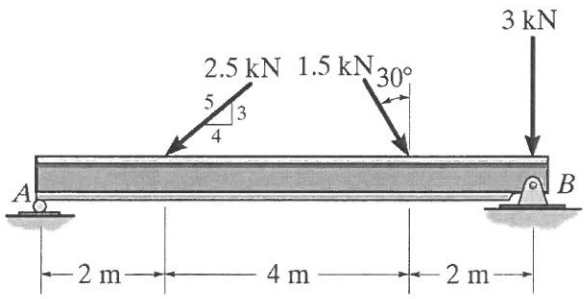

Figure 2

c) Replace the force system acting on the beam by an equivalent force and couple moment at point B. Refer to Figure 2.

[9 marks]

Question 2

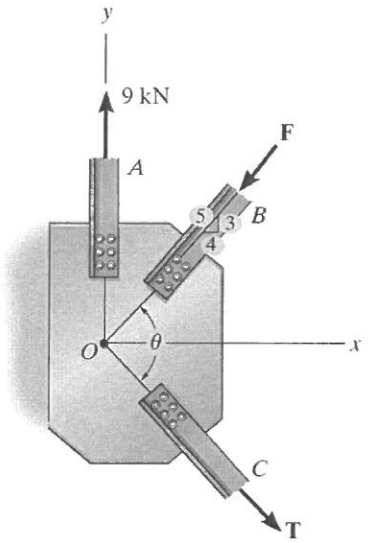

Figure 3

a) The members of a truss are connected to the gusset plate. If the forces are concurrent at point O, determine the magnitudes of F and T for equilibrium. Take θ = 90°. Refer to Figure 3.

[8 marks]

b) The gusset plate is subjected to the forces of three members. Determine the tension force, T, in member C and angle θ for equilibrium. The forces are concurrent at point O. Take F = 8 kN. Refer to Figure 3.

[8 marks]

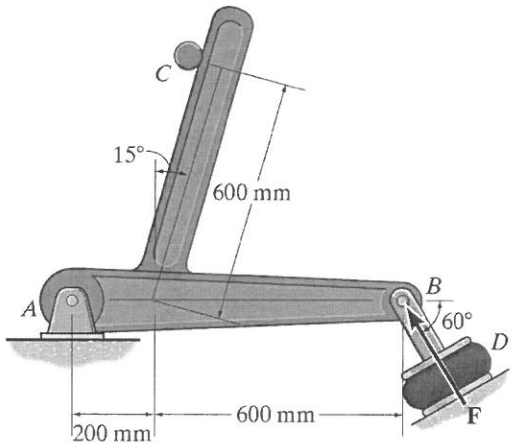

Figure 4

c) The actuator at D is used to apply a force of F = 200 N on the member at B. Referring to Figure 4, determine the horizontal and vertical components of reaction at pin A and the force at C on the member. (Hint: Draw the FBD showing all forces to simplify the problem)

[9 marks]

Question 3

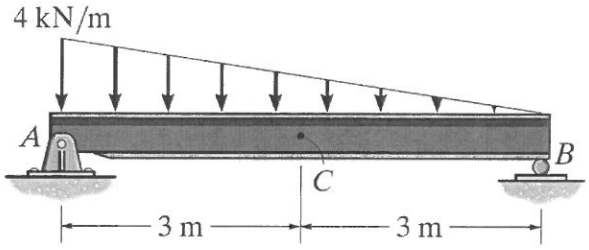

Figure 5

a) Determine the internal normal force, shear force, and moment at point C in the simply supported beam as shown in Figure 5.

[14 marks]

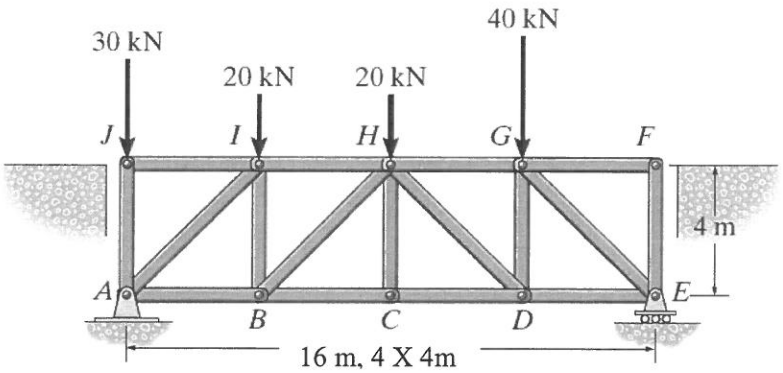

Figure 6

b) The Howe bridge truss is subjected to the loading shown in Figure 6. Determine the force in members *HI*, *HB*, and *BC*, and state if the members are in tension or compression.

[11 marks]

Question 4

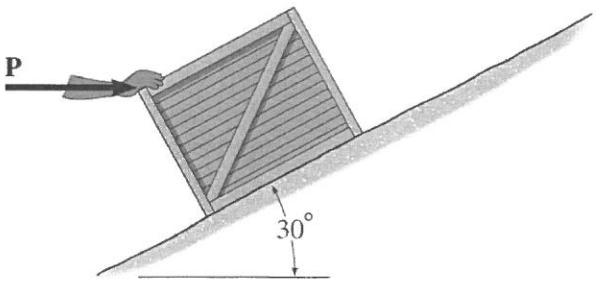

Figure 7

a) Determine the minimum horizontal force P required to hold the crate from sliding down the plane. The crate has a mass of 50 kg and the coefficient of static friction between the crate and the plane is $\mu_s = 0.25$. Refer to Figure 7.

[8 marks]

b) Determine the minimum force P required to push the crate up the plane. The crate has a mass of 50 kg and the coefficient of static friction between the crate and the plane is $\mu_s = 0.25$. Refer to Figure 7.

[8 marks]

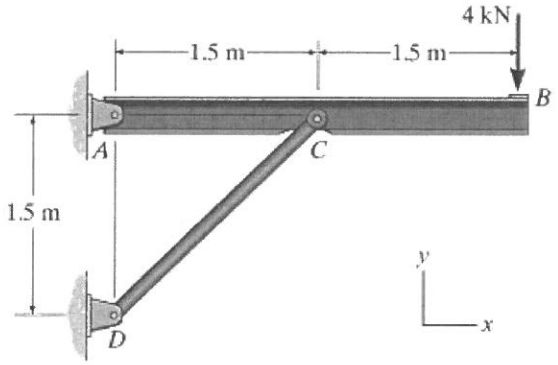

Figure 8

c) Referring to Figure 8, determine the horizontal and vertical components of reaction at pin A and the reaction on the beam at C.

[9 marks]

Question 5

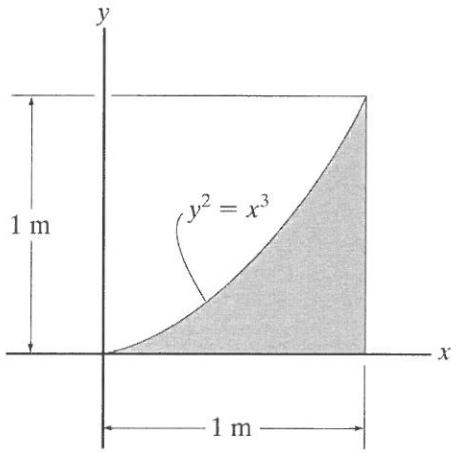

Figure 9

a) Determine the area and the centroid $(\bar{x}, \bar{y})$ of the shaded area. Refer Figure 9.

[10 marks]

b) Determine the moment of inertia of the shaded area about the x axis. Refer Figure 9.

[6 marks]

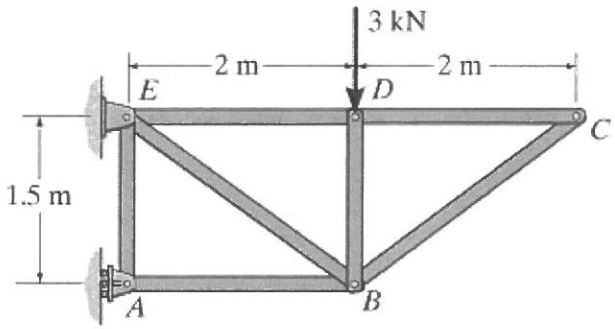

Figure 10

c) Identify the zero force members in the truss shown in Figure 10.

[4 marks]

d) For a fixed support, how many unknown/s are there? List down the unknown/s.

[5 marks]

~ The End ~

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