INTI International University & Colleges

FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**January 2021**
Programme	:	Diploma in Mechanical Engineering (DMEN)
Course	:	**EGR1174: Engineering Statics**
Date of Examination	:	8 March 2021 (Monday)
Time	:	8.00am – 10.15am Reading Time : Nil
Duration	:	2 Hours 15 Minutes

Special Instructions :

This paper consists of **FOUR (4)** questions. Answer all **FOUR (4)** questions. All questions carry equal marks.

Material permitted :
Non-Programmable Scientific Calculator

Materials provided :
Formulae List

Examiner(s)	:	**Nur Hafizah Habideen, Koh Mui Siang**
Chief Moderator	:	Tham Chan Seng

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

DIPLOMA IN MECHANICAL ENGINEERING PROGRAMME (DMEN)
EGR1174: ENGINEERING STATICS
FINAL ALTERNATIVE ASSESSMENT: JANUARY 2021 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer all **FOUR (4)** questions. All questions carry equal marks.

Question 1

Figure Q1 shows a truss. Determine the force in each member of the truss and state if the members are in tension or compression. Given $\theta = 30^{o}$.

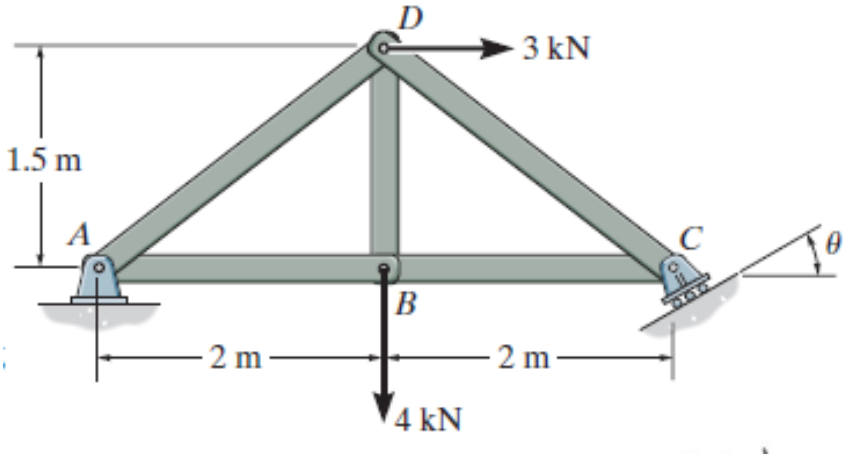

Figure Q1

(25 marks)

Question 2

Figure Q2 shows a distributed loading system on the beam AB, where A is pin-connected and B is roller-supported.

(a) Determine the support reaction at A and B.

(7 marks)

(b) Determine the shear and moment as a function of x.

(12 marks)

(c) Sketch the shear and moment diagrams for the beam.

(6 marks)

Assume point A as the origin for all your function formulation along the AB line.

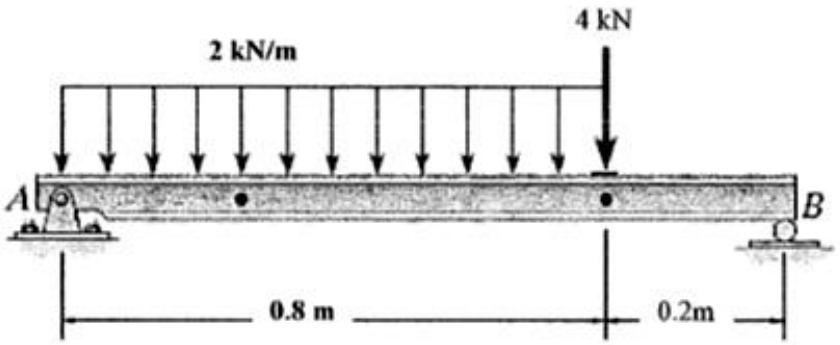

Figure Q2

Question 3

(a) A man is exerting horizontal force P on the boxes that stacked together as shown in Figure Q3a. Each box has a mass of 75 kg. The coefficient of static friction between the floor and boxes is 0.2.

(i) Determine the minimum force P for motion to occur.

(8 marks)

(ii) State if tipping would occur due to the motion.

(2 marks)

(iii) State if slipping would occur due to the motion.

(6 marks)

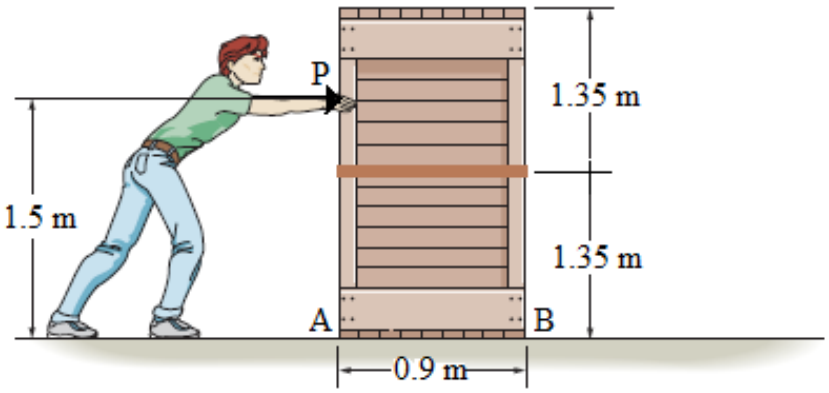

Figure Q3a

(b) Figure Q3b shows the trolley and its contents have a total mass of 6000 kg and a center of gravity at G. Given the coefficient of static friction between the wheels and the tracks is $\mu_s = 0.4$ when the wheels are locked.

(i) Sketch the free body diagram.

(2 marks)

(ii) Determine the normal force acting on the front wheels at B.

(2 marks)

(iii) Determine the normal force acting on the rear wheels at A.

(2 marks)

(iv) State whether the car move or not.

(3 marks)

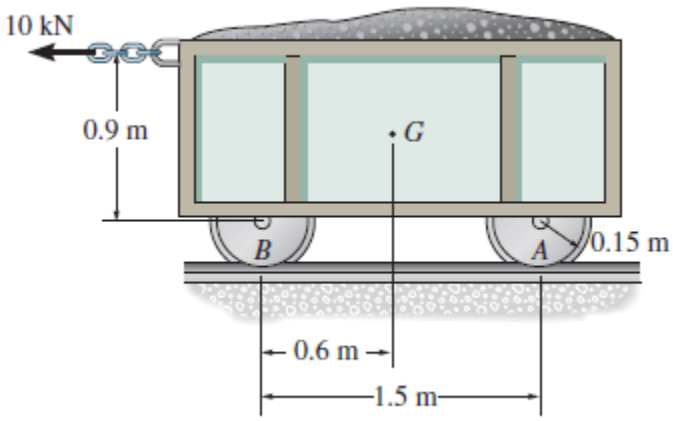

Figure Q3b

Question 4

(a) Determine the centroid of the cross-sectional area of the beam constructed from a channel and a plate in Figure Q4a. Assume all corners are square and neglect the size of the weld at *A*.

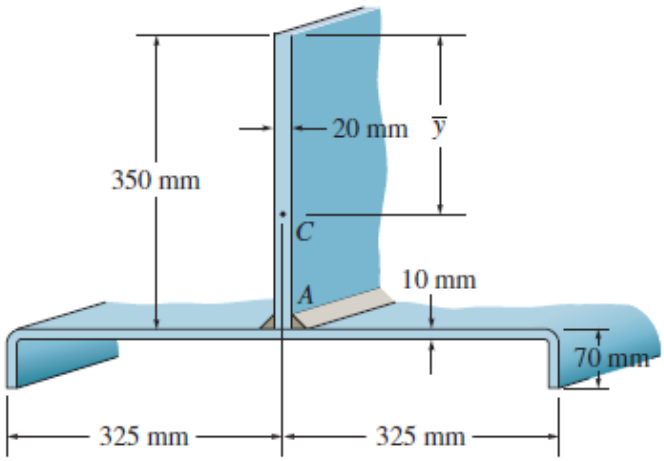

Figure Q4a

(9 marks)

(b) Determine the *x*-coordinate of centroid for the cross sectional area shown in Figure Q4(b) and then calculate the moment of inertia about the *y'*-centroidal axis.

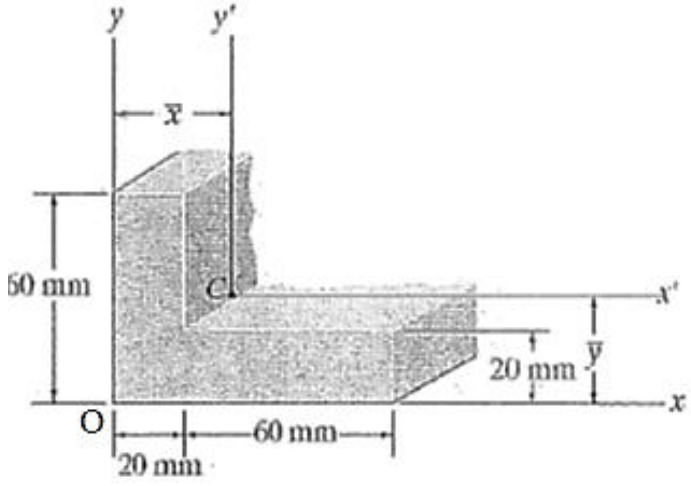

Figure Q4b

(16 marks)

~THE END~