



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2021/2022**

**COURSENAME : STATICS**

**COURSECODE : BNJ 10203**

**PROGRAMMECODE : BNL**

**EXAMINATIONDATE : JULY 2022**

**DURATION : 3 HOURS**

**INSTRUCTION :**

- 1. ANSWER FIVE (5) QUESTIONS ONLY**
- 2. THIS FINAL EXAMINATION IS CONDUCTED VIA CLOSED BOOK.**
- 3. STUDENTS ARE PROHIBITED TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK**

**THIS QUESTION PAPER CONSISTS OF NINE (9) PAGES**

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- (ii) Calculate the magnitudes of the total brake frictional force,  $F$  for the rear set of wheels  $B$  and the total normal forces at *both* front wheels  $A$  and both rear wheels  $B$  for equilibrium.

(10 marks)

- Q4** (a) Define zero force members in simple trusses model.

(2 marks)

- (b) Determine the force in each member of truss and state if the members are in tension (T) or compression (C). Set  $P = 8$  kN. The trusses are illustrated as in **Figure Q4(b)**.

- (i) Calculate the force in member  $DC$  and  $DE$  at joint D.

(5 marks)

- (ii) Calculate the force in member  $CE$  and  $CB$  at joint C.

(5 marks)

- (iii) Calculate the force in member  $BE$  and  $BA$  at joint B.

(5 marks)

- (iv) Calculate the force in member  $EA$  at joint E.

(3 marks)

- Q5** (a) **Figure Q5(a)** shows the toggle clamp that subjected to a force  $F$  at the handle.

- (i) Draw free body diagram (FBD) of handle  $BC$  and toggle clamp  $ABE$ .

(6 marks)

- (ii) Calculate reaction force at B, C and the vertical clamping force acting at  $E$ .

(8 marks)

- (b) **Figure Q5(b)**, shows the uneven plate. Determine the location  $(x_c, y_c)$  of the plate centroid by using method of composite bodies

(6 marks)

- Q6** (a) State dry friction definition; and show **ONE (1)** example application of dry friction and draw its free body diagram. (4 marks)
- (b) **Figure Q6(b)** shows the car travels along the shoulder of the road at constant velocity. The car has a mass of 1.6 Mg and center of mass at  $G$ . The coefficient of static friction between the shoulder of the road and the tires is  $\mu_s = 0.4$
- (i) Draw the free body diagram of the car. (4 marks)
- (ii) Calculate the the greatest slope the shoulder can have without causing the car to slip and tip over (10 marks)
- (i) Base on (b) (ii) determine wheter the car slip or tip first? (2 marks)

**-END OF QUESTIONS -**

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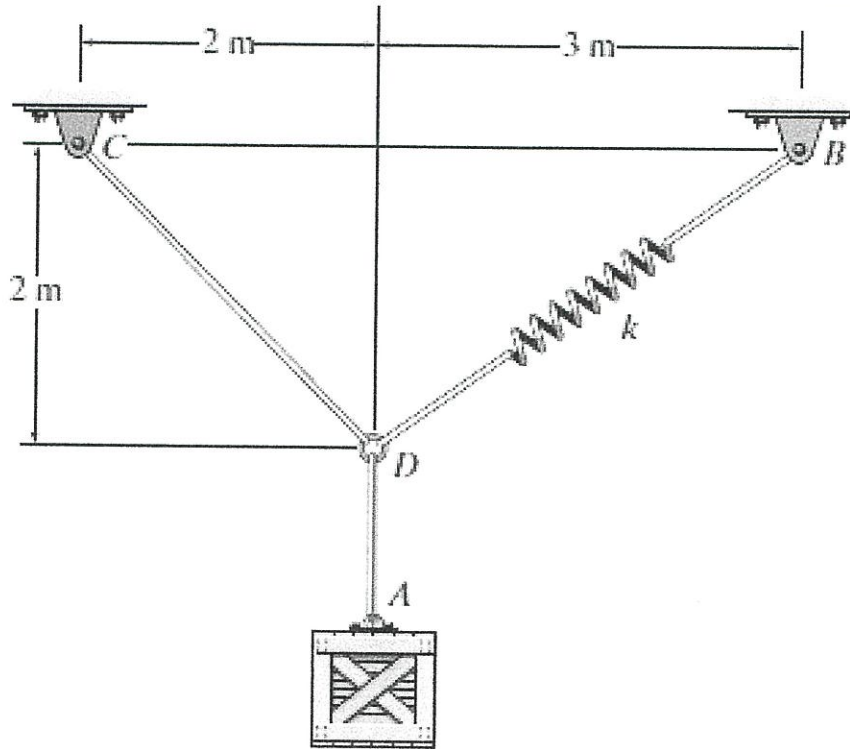


Figure Q1(a)

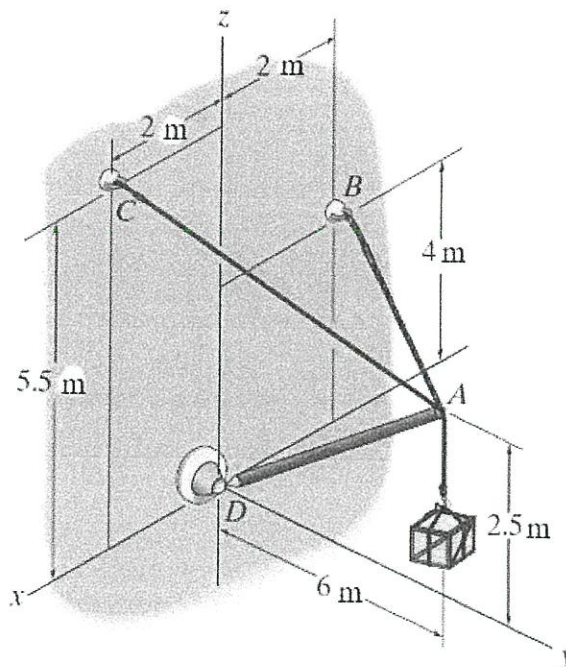


Figure Q1(b)

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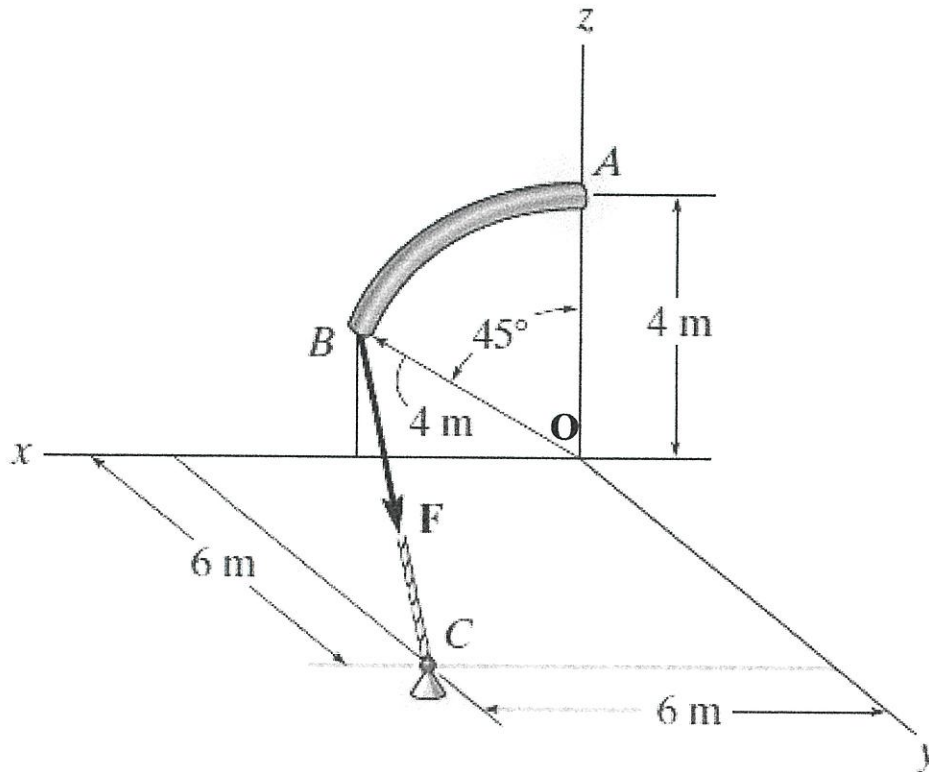
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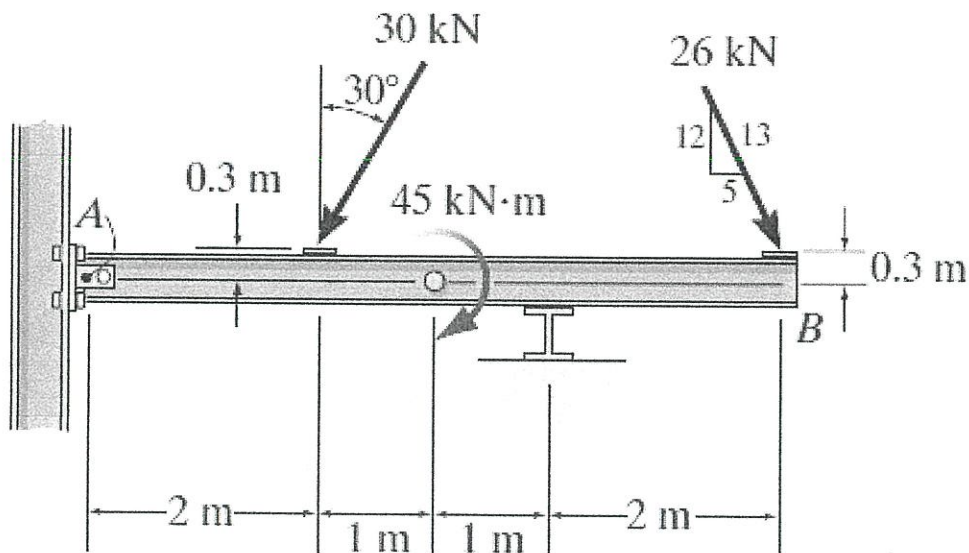
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**Figure Q2(b)**



**Figure Q3(a)**

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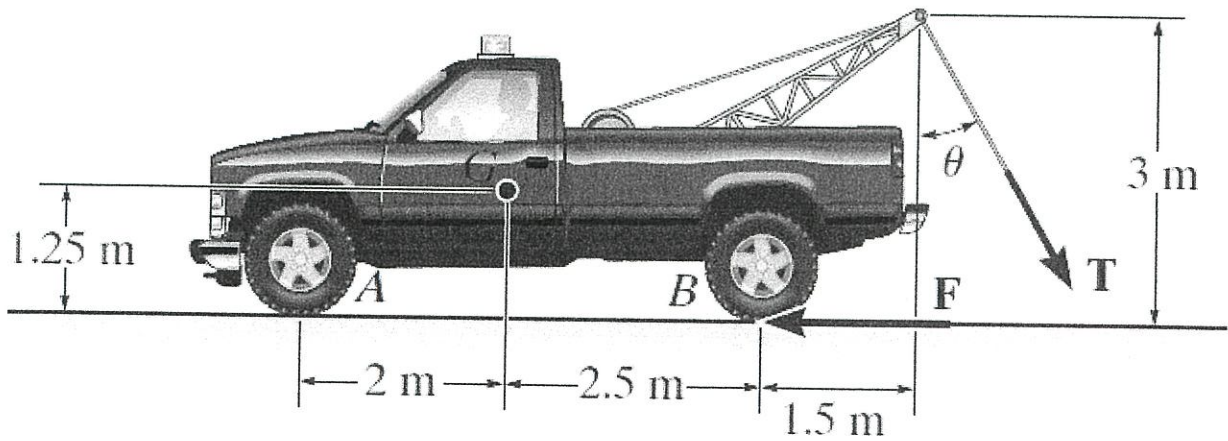


Figure Q3(b)

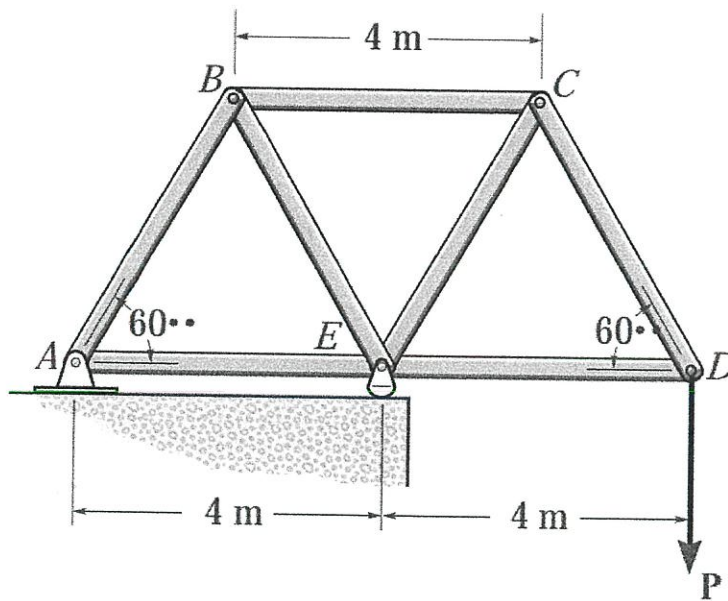


Figure Q4(b)

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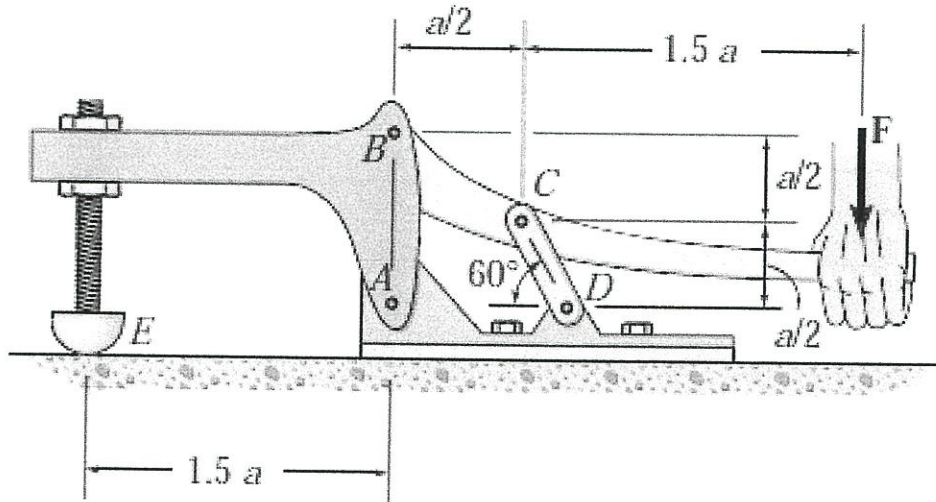


Figure Q5(a)

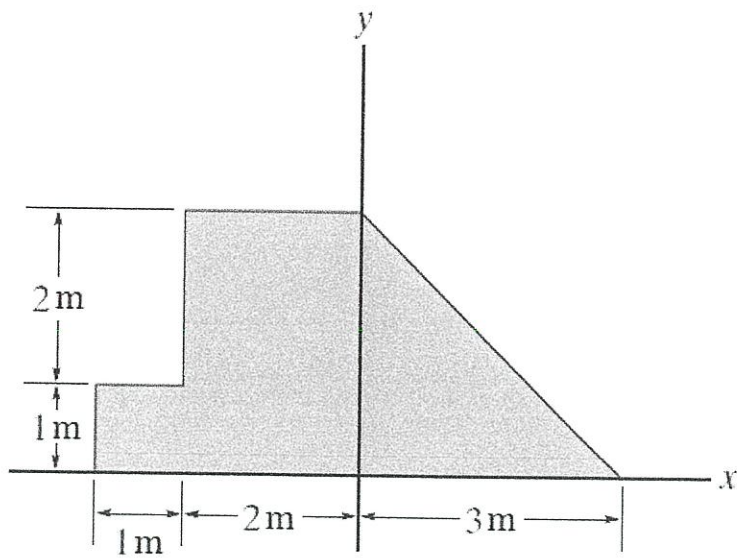


Figure Q5(b)

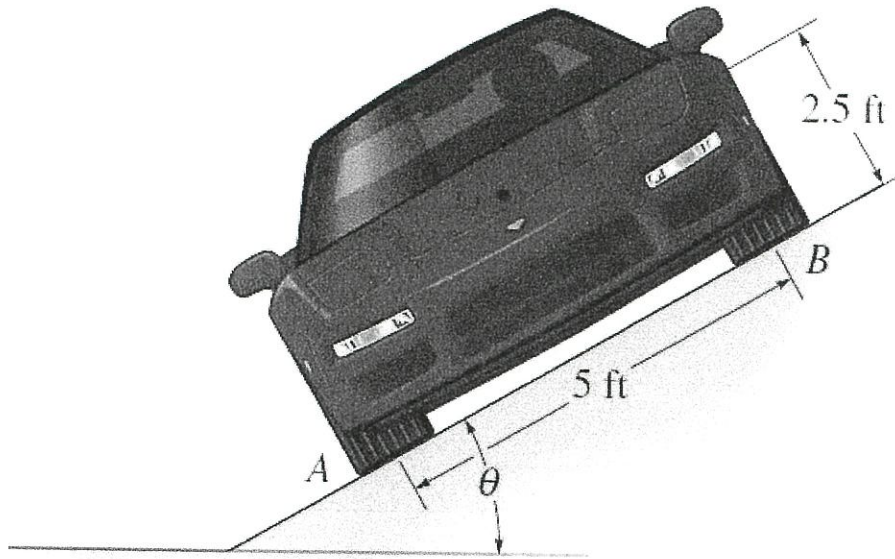
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**Figure Q6(b)**

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