



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE : FMB 10102
SUBJECT TITLE : STATICS
LEVEL : BACHELOR
TIME / DURATION : ~~12.30pm - 2.30pm~~
1.00pm - 3.00pm
(2 HOURS)
DATE : 29 APRIL 2010

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of TWO (2) sections. Section A and B. Answer ALL questions in section A. For section B, answer THREE (3) questions only.
6. Answer ALL questions in English.

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

The crane shown in figure 1 can be adjusted for any angle $0^\circ \leq \theta \leq 90^\circ$ and any extension $0 \leq x \leq 5\text{m}$. For a suspended mass of 120 kg, determine the moment developed at A as a function of x and θ .

- (a) Calculate the values of both x and θ develop the maximum possible moment at A? (10 marks)
- (b) Compute this moment. Neglect the size of the pulley at B. (10 marks)

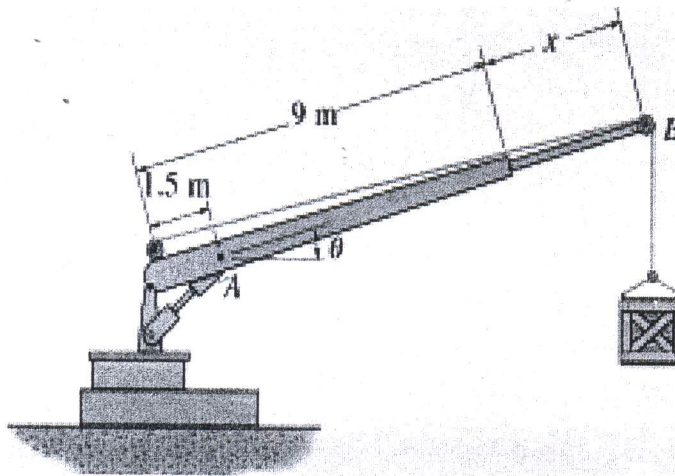


Figure 1

Question 2

A sign of uniform density weighs 270 lb and is supported by a ball and socket joint at A, and by two cables BD and EC. (Refer to figure 2)

- (a) Calculate the tension in cable BD and EC (10 marks)
- (b) Then, determine the reaction force at A. (10 marks)

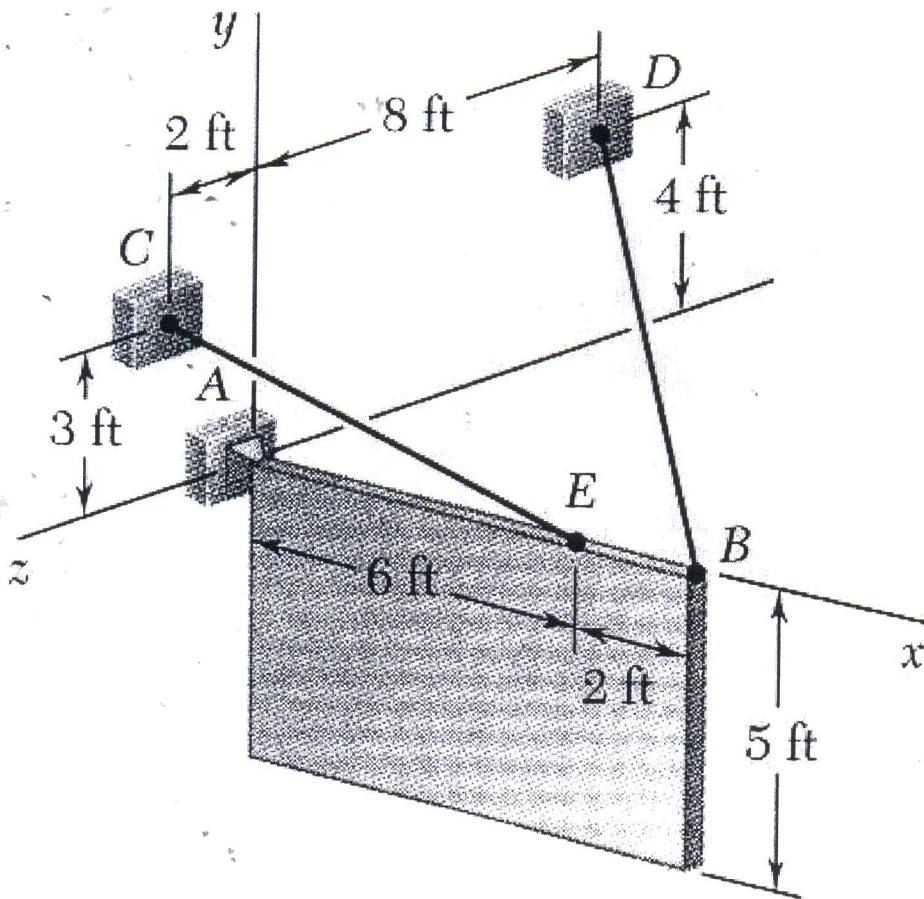


Figure 2

SECTION B (Total: 60 marks)**INSTRUCTION: Answer THREE (3) questions ONLY.****Please use the answer booklet provided.****Question 3**

A 800 N box rests on a plane surface inclined at 30 degrees from horizontal. A physics student finds that she can prevent it from sliding if she applies a force of 200N parallel to the surface.

- (a) Determine the coefficient of static friction between the box and the surface?

(10 marks)

- (b) Analyze the greatest force that can be applied to the box before it starts sliding up the incline?

(10 marks)

Question 4

A 200 N block on an inclined 30° surface is held in place with a 300 N horizontal force. The coefficient of static friction is 0.3.

- (a) Determine if the horizontal force is sufficient to hold the block in place.
(10 marks)
- (b) Calculate the angle of inclination needed to hold the block in place if the horizontal force is removed from the block.
(10 marks)

Question 5

The screw-jack shown in figure 4 carries a load of **6kN** and has a square thread, single start screw of **18mm pitch** and **50mm mean diameter**. If the **coefficient of friction** is **0.22**, justify:

- (a) The **angle of inclination**; (5 marks)
- (b) The **angle of friction**; (5 marks)
- (c) The **torque to raise** the load; (5 marks)
- (d) The **torque to lower** the load. (5 marks)

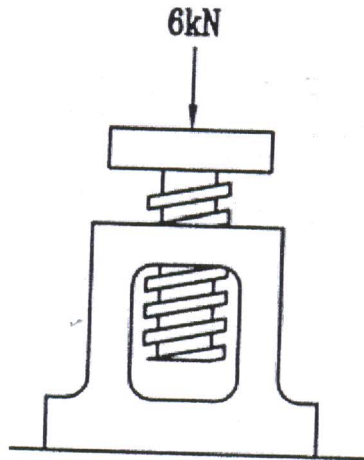


Figure 4: screw jack

Question 6

The hood of the automobile in figure 5 is supported by the strut AB , which exerts a **force F** on the hood.

- (a) Calculate the Cartesian vector for **force F** (10 marks)
- (b) Discriminate the **moment** of this force about the hinged axis y . (10 marks)

Given:

$F := 100\text{N}$

$a := 0.6\text{m}$

$b := 1.2\text{m}$

$c := 0.6\text{m}$

$d := 1.2\text{m}$

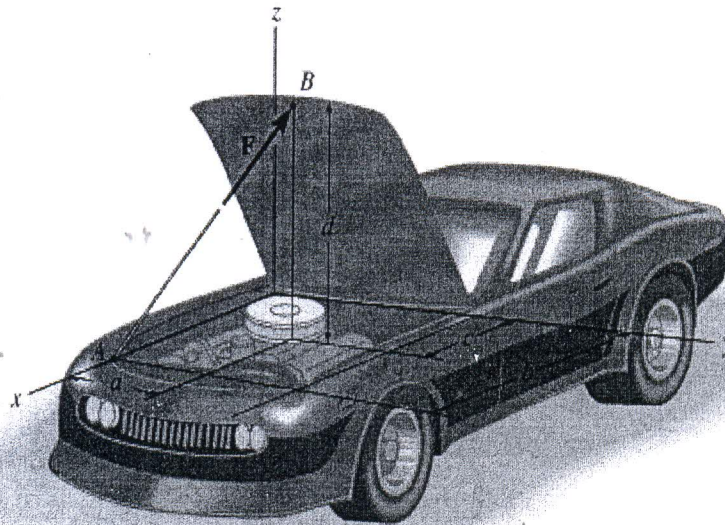


Figure 5

END OF QUESTION