



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAM
JANUARY 2011 SESSION

SUBJECT CODE : FMD 12102
SUBJECT TITLE : STATICS AND DYNAMICS
LEVEL : DIPLOMA
TIME / DURATION : 3.30pm – 6.00pm
(2.5 HOURS)
DATE : 11 MAY 2011

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 ANY two (2) questions.
 6. Answer all questions in English.
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THERE ARE 6 PAGES OF QUESTIONS AND 1 PAGE OF FORMULAE, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

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

Question 1

Determine the magnitude and direction of resultant force on the bracket as shown in figure 1, measured counterclockwise from the positive x' axis,

(20 marks)

Given:

$F_1 = 300\text{N}$

$F_2 = 200\text{N}$

$F_3 = 180\text{N}$

$\theta = 10^\circ$

$\theta_1 = 60^\circ$

$c = 5$

$d = 12$

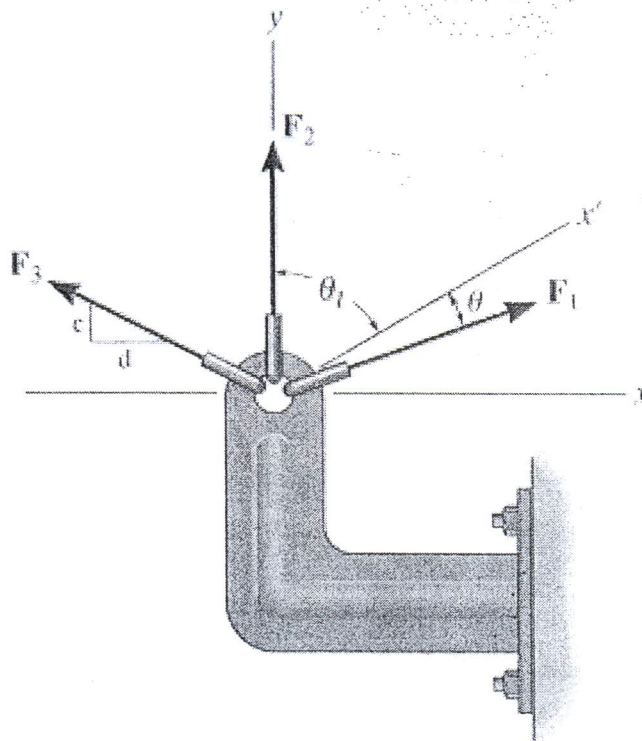


Figure 1

Question 2

The pipe of mass M in figure 2 is supported at A by a system of five cords. Determine the force in each cord for equilibrium.

(20 marks)

Given:

$M = 30 \text{ kg}$

$c = 3$

$d = 4$

$\theta = 60^\circ$

$g = 9.81 \text{ m/s}^2$

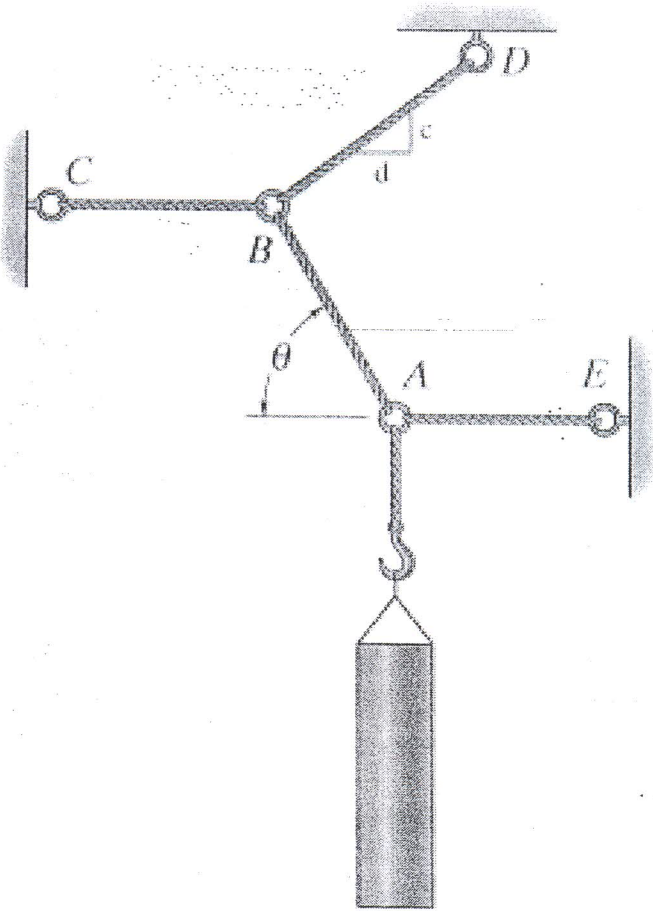


Figure 2

Question 3

- (a) A student pulls on a heavy box with a force of 300 N and moves it a distance of 5 meters as shown in figure 3. If the force is applied at an angle of $\alpha = 30$ degrees as shown below, calculate the work done by the student.

(10 marks)

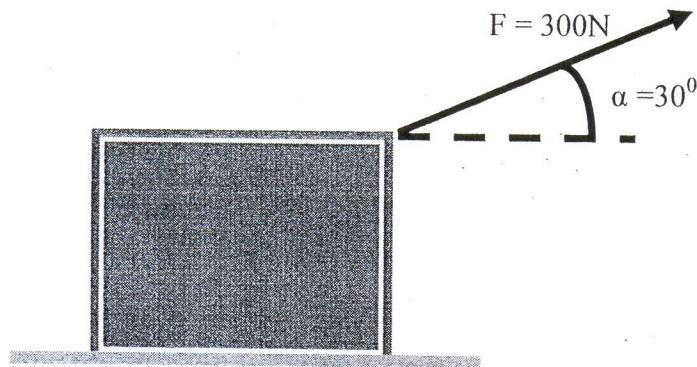


Figure 3.

- (b) A manually operated winch line is used to lift a 200 kg mass to the roof of a building. Assuming the power at a steady rate of 200 Watts, calculate time (s) taken to lift the weight 10 meters?

(10 marks)

SECTION B (40 Marks)

INSTRUCTION: Answer TWO (2) questions only.

Please use the answer booklet provided.

Question 4

A ball is launched into the air at an angle of 32.0° with an initial speed of 18.0 m/s .

Neglecting air resistance, determine how long (s) the ball will be in the air?

(20 marks)

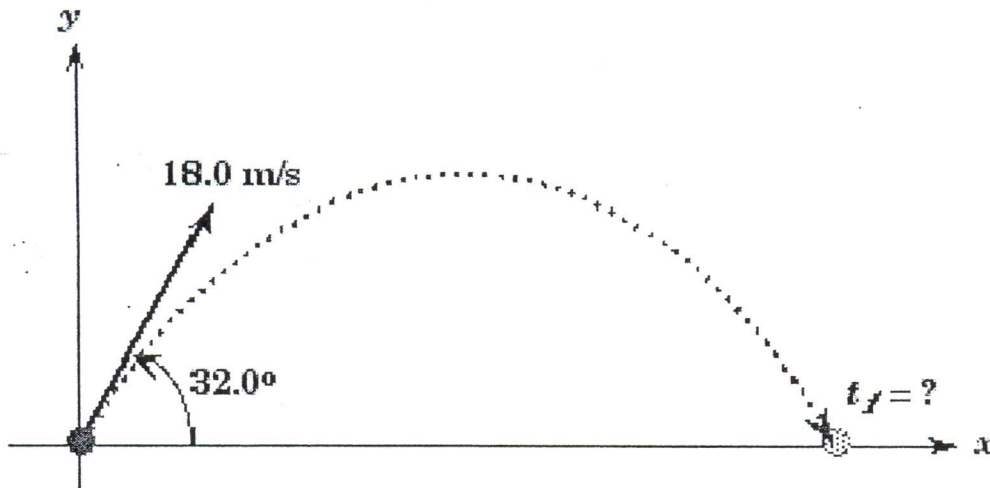


Figure 4

Question 5

- (a) Calculate the coordinates of the centroid (x, y) of the shaded area shown in Figure 5. (10 marks)

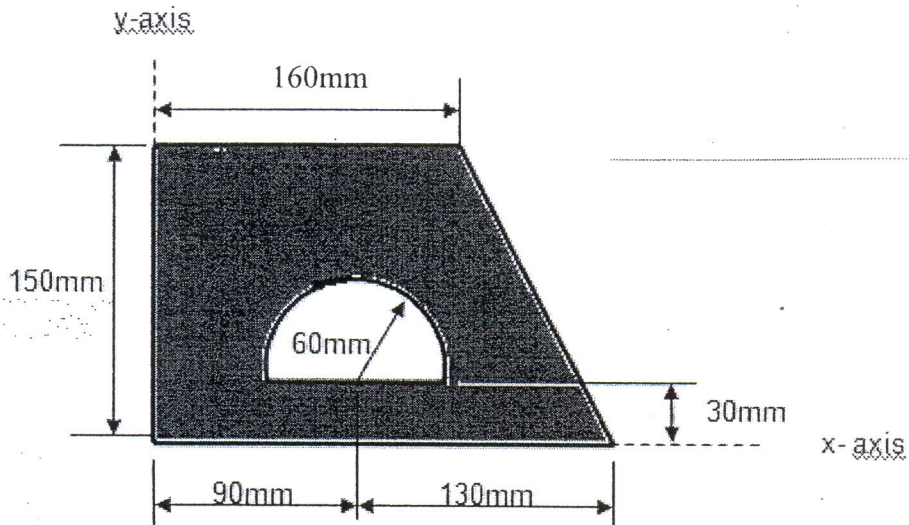


Figure 5

- (b) Determine the resultant moment of the four forces acting on the rod about point O shown in figure 6. (10 marks)

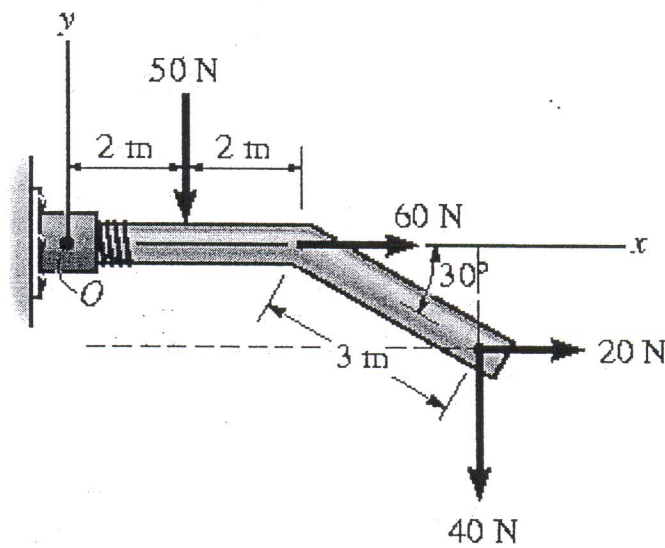


Figure 6

Question 6

The crate of mass M is subjected to forces F_1 and F_2 , as shown in figure 6. If it is originally at rest, determine the distance it slides in order to attain a speed v . The coefficient of kinetic friction between the crate and the surface is μ_k .

(20 marks)

Given:

$$M = 100 \text{ kg}$$

$$F_1 = 800 \text{ N}$$

$$F_2 = 1.5 \text{ kN}$$

$$\theta_1 = 30^\circ$$

$$\theta_2 = 20^\circ$$

$$v = 6 \text{ m/s}$$

$$\mu_k = 0.2$$

$$g = 9.81 \text{ m/s}^2$$

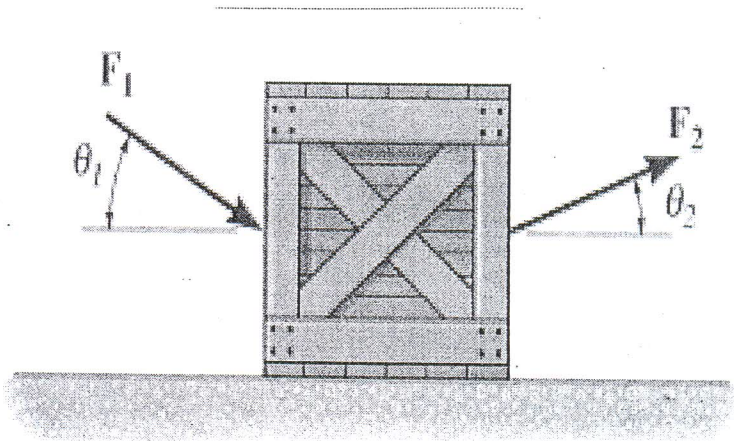


Figure 7

END OF QUESTION

Formulae

$$s = ut$$

$$a = \frac{v - u}{t}$$

$$s = ut + \frac{1}{2}at^2$$

$$v^2 = u^2 + 2as$$

$$KE = \frac{1}{2}mv^2$$

$$PE = mgh$$

$$W = F.s$$

$$W_{net} = \Delta KE = KE_f - KE_o$$

$$\bar{P} = \frac{\Delta E}{\Delta t} = \frac{W}{t}$$