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CONFIDENTIAL

SET B

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE	:	FMD 12102
SUBJECT TITLE	:	STATICS AND DYNAMICS
LEVEL	:	DIPLOMA
TIME / DURATION	:	9.00am – 11.00am (2 HOURS)
DATE	:	08 MAY 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 answer on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This questions paper consists of TWO (2) sections. Section A and B. Answer ALL questions in section A. For section B answer TWO (2) questions only.
6. Answer all questions in English.

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Determine the **magnitude** of the resultant force $F_R = F_1 + F_2 + F_3$ and its **direction**, measured counterclockwise from the positive *x* axis.

(20 marks)

Given:

$F_1 = 500\ \text{N}$
$F_2 = 700\ \text{N}$
$F_3 = 200\ \text{N}$
$\alpha = 45^\circ$
$\beta = 60^\circ$
$\gamma = 75^\circ$

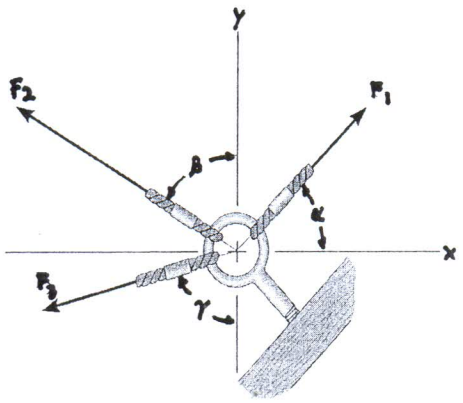

Figure 1

Question 2

The motor at *B* winds up the cord attached to the crate of weight *W* with a constant speed. Determine the force in cord *CD* supporting the pulley and the angle θ for equilibrium. Neglect the size of the pulley at *C*.

(20 marks)

Given:

W = 325N

C = 12

d = 5

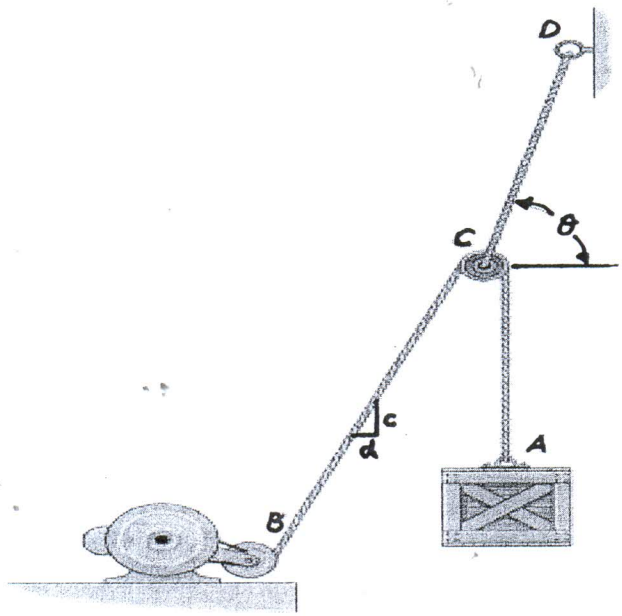

Figure 2

Question 3

The boom has length L, weight Wb, and mass center at G. If the maximum moment that can be developed by the motor at A is M, determine the maximum load W, having a mass center at G', that can be lifted.

(20 marks)

Given:

L = 9m

Wb = 4kN

a = 4m

b = 0.5m

θ = 30deg

M = 30 kN· m

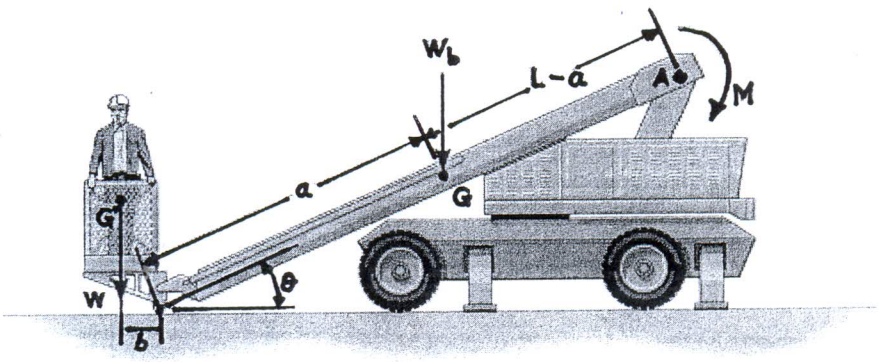

Figure 3

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO (2) questions ONLY.
Please use the answer booklet provided.

Question 4

The crate has a mass ***M*** and is subjected to a towing force **P** acting at a θ_1 angle with the horizontal. If the coefficient of static friction is μ_s, determine the ***magnitude of P*** to just start the crate moving down the plane.

(20 marks)

Given:

$M = 100\ \text{kg}$
$\theta_1 = 20°$
$\theta_2 = 30°$
$\mu_s = 0.3$
$g = 9.81\ \text{m/s}^2$

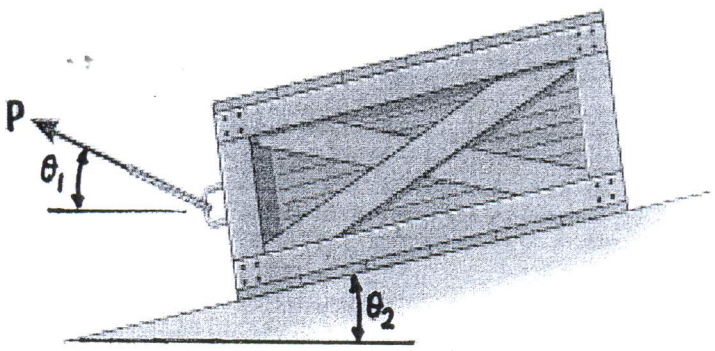

Figure 4

Question 5

Measurements of a shot recorded on a videotape during a basketball game are shown in figure 5. The ball passed through the hoop even though it barely cleared the hands of the player *B* who attempted to block it. Neglecting the size of the ball, determine:

a. time taken from A to C

(8 marks)

b. the magnitude v_A of its initial velocity

(4 marks)

c. time taken from A to B

(4 marks)

d. height *h* of the ball when it passes over player *B*.

(4 marks)

Given:

$a = 1.5m$
$b = 6.8m$
$c = 1.2m$
$d = 3m$
$\theta = 30^0$
$g = 9.81\,m/s$

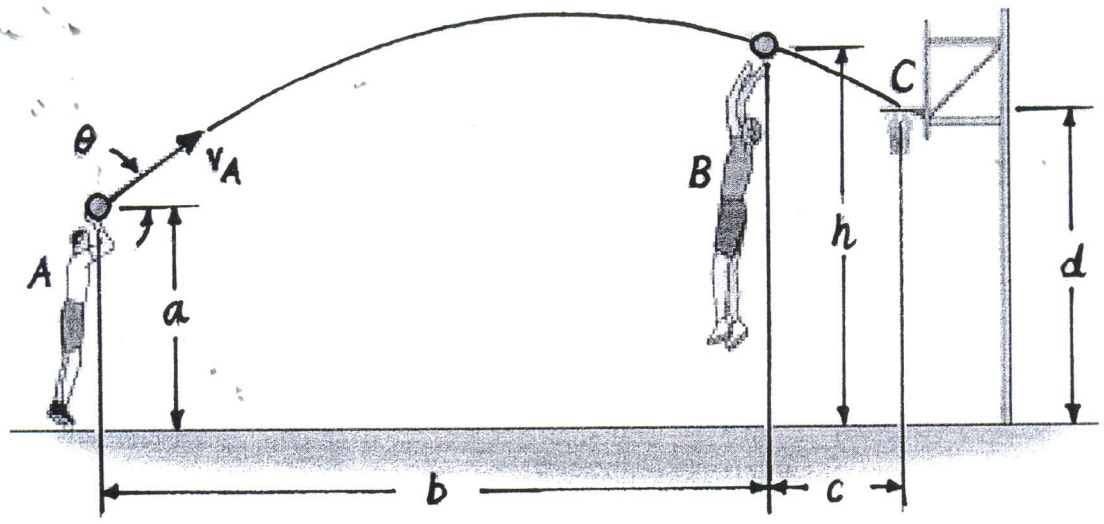

Figure 5

Question 6

a. A rocket traveling 100 m/s accelerates at a rate of 4 m/s^2.

i. Determine the speed of the rocket after it has traveled 1 kilometers

(5 marks)

ii. Calculate time does it take to reach this speed

(5 marks)

b. An engineer must design a runway to accommodate airplanes that must reach a ground velocity of 80 m/s before they can take off. These planes are capable of being accelerated uniformly at the rate of 5 m/s^2.

i. Determine how long it will take the planes to reach takeoff speed

(5 marks)

ii. Calculate the minimum length of runway needed.

(5 marks)

END OF QUESTION