



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE : FMD 10202
SUBJECT TITLE : DYNAMICS
LEVEL : DIPLOMA
TIME / DURATION : 8.00pm – 10.00pm
(2 HOURS)
DATE : 04 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 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

- (a) A helicopter accelerates uniformly upward at 1 m/s^2 to a height of 350 m. By the time it reaches 400 m, it has decelerated to zero vertical velocity with an acceleration of 7 m/s^2 . It then accelerates horizontally at 5 m/s^2 to a velocity of 20 m/s. Determine the total time required for this sequence.

(13 marks)

- (b) A boy in *Figure 1* throw a rock at A with horizontal velocity, V_0 of 30 m/s and have it just clear the obstruction at B. Determine the distance S_H .

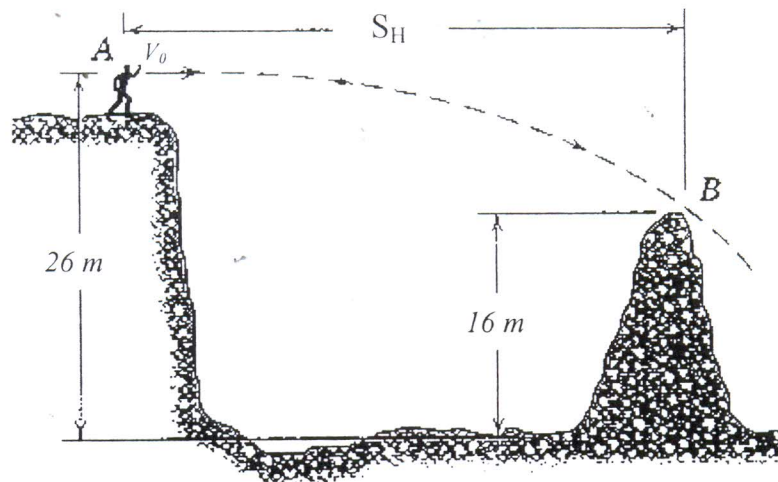


Figure 1

(7 marks)

Question 2

(a) A lift cage, together with its load, has a mass of 3000 kg and is raised vertically by a cable. Determine the pull exerted by the cable if the lift reaches a velocity of 4 m/s after rising 5 m from rest.

(9 marks)

(b) A trolley of weight 10 N is to be pulled up smooth incline at 9° to the horizontal with an acceleration of 2.5 m/s^2 . What force F parallel to the incline is required if friction at the wheels is negligible? Also determine the work done by the force F acting through a distance of 3 m.

(11 marks)

Question 3

a) A motor boat traveling 4.0 m, East and then 3.0 m, North. What is the displacement of the motor boat?

(7 marks)

b) Starting from rest, pulley A (shown in *Figure 2*) is given a constant angular acceleration of 7 rad/s^2 . Determine the velocity of block B when it has risen to 1000 cm. The pulley has an inner hub D which is fixed to C and turns with it.

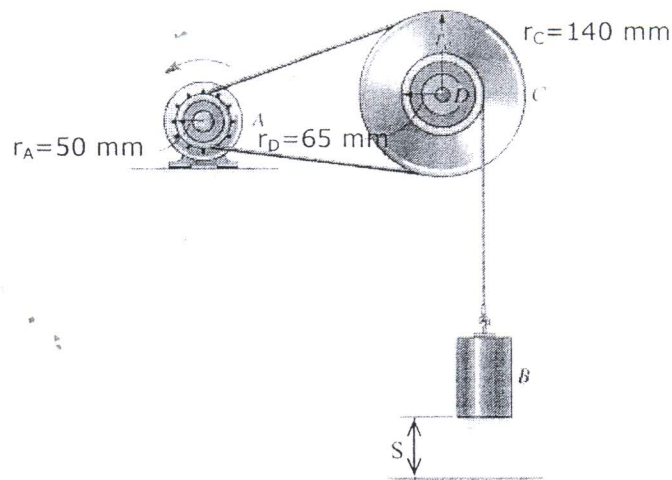


Figure 2

(13 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO questions only.

Please use the answer booklet provided.

Question 4

- (a) A vehicle of mass 5.3 t is moving with a velocity of 26 m/s. Determine how long it will take to bring it to rest with a braking effort of 7 kN.

(5 marks)

- (b) In *Figure 3*, block A has mass of 15 kg and the coefficient of friction between the block and the horizontal surface is 0.3. What is the mass of block B that is required to accelerate the system at 2.5 m/s^2 ?

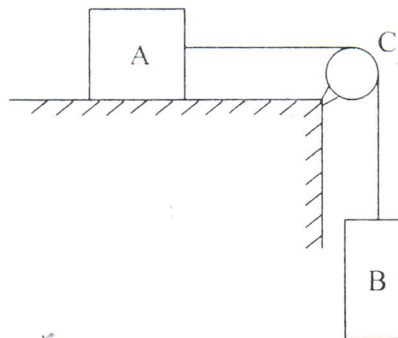


Figure 3

(15 marks)

Question 5

- (a) What average speed should TGV train travel at to cover the distance from Marseille to Paris, equal to 783 km, in 3 hours?

(5 marks)

- (b) In an automated materials-handling operation, a metal component of mass 2.5 kg is pushed by a constant horizontal force F_p of 4.79 N along a horizontal table-top surface before falling into a chute. The coefficient of friction between the component and the supporting surface is 0.11. If the motion starts from rest, how long does it take the component to move a horizontal distance of 900 mm, and what is the velocity at the end of this period of time?

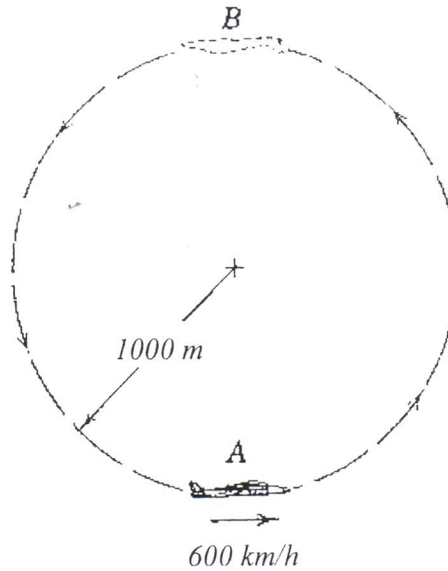
(15 marks)

Question 6

- (a) The output shaft of an electric motor accelerates from rest, at the rate of 10 rad/s^2 , to its final angular velocity in 15.2 s. What is the final angular velocity? Determine also the total number of revolutions made by the shaft in that period.

(9 marks)

- (b) A pilot in *Figure 4* flies an airplane at a constant speed of 600 km/h in the vertical circle of radius 1000 m. Calculate the force exerted by the seat on the 80 kg pilot at point A and at point B.

*Figure 4*

(11 marks)

END OF QUESTION