Document No : UniKL_MFI_SD_AC41
Revision No: 02
Effective Date: 01 December 2008

CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE	: FMB 10202
SUBJECT TITLE	: DYNAMICS
LEVEL	: BACHELOR
TIME / DURATION	: 9.00am – 11.30am (2.5 HOURS)
DATE	: 03 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 answers 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 THREE (3) questions only.
6. Answer ALL questions in English.

THERE ARE 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

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

Question 1

(a) An object with negligible air resistance is dropped from a height of 85 m. Determine how long it takes to land and velocity it strikes the land.

(5 marks)

(b) Calculate the total distance and displacement of a plane that flies 120 km east and then 250 km southeast.

(5 marks)

(c) A truck accelerates uniformly from rest to reach 90 km/h in 20 s. The speed remains constant for 150 s. The truck driver decides to decelerate the speed to 70 km/h in 20 s. The driver drives with this constant speed for another 60 s. At the end of this time the truck decelerate again to rest in 35 s. Find the total distance traveled and the average velocity of the truck?

(10 marks)

Question 2

(a) A new truck engine was developed and capable of producing 60 MJ in 21 min. Determine the power developed by the engine.

(5 marks)

(b) A truck of mass 12.5 tones that carries a load of 1.2 tones (*Figure 1*) is drawn by its engine which exerts a tractive effort of 73 kN. The rolling resistance is 14.2 N/ton. Determine the time and distance required to reach a velocity of 80 km/h from rest, on level road.

(15 marks)

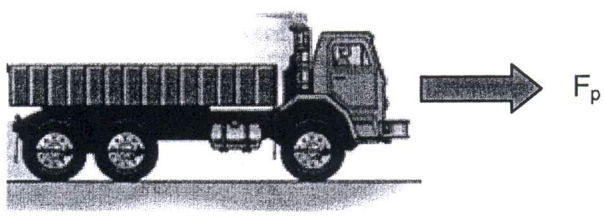

Figure 1

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE questions only.
Please use the answer booklet provided.

Question 3

(a) A stone is thrown from the edge of a vertical cliff with a velocity of Vo m/s at an angle 25° below the horizontal. The stone strikes the sea at a point 150 m from the foot of the cliff. *Figure 2* shows the complete motion of the projectile. Determine the velocity, V_0 of the stone.

(14 marks)

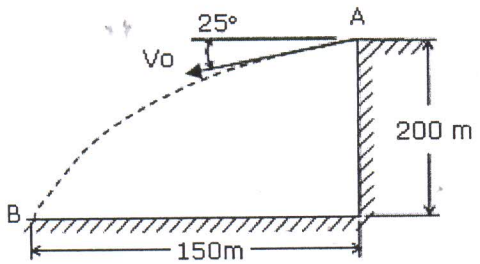

Figure 2

(b) One car starts from rest and has an acceleration of 1.2 m/s². A second car has an initial velocity of 15.2 m/s and a retardation of 0.8 m/s². After how many seconds are they moving with the same velocity?

(6 marks)

Question 4

(a) A lift has a mass of 1.05 tones. Calculate the force in the lifting cable when the lift is :

(i) moving downward at a constant velocity

(ii) moving downwards with an acceleration of 1.5 m/s²

(iii) moving upwards with an acceleration of 1.2 m/s²

(iv) moving upwards with a retardation of 1.25 m/s²

(12 marks)

(b) A car of mass 1300 kg descends a hill of 1 in 5. Calculate, using an energy method, the average braking force required to bring the car to rest from 75 km/h in 18 m. The friction resistance to motion is 250 N.

(8 marks)

Question 5

(a) Determine the torque, work and average power when a flywheel of mass moment of inertia of 50 kg.m² is accelerated from 705 rpm to 1310 rpm in 21s.

(7 marks)

(b) One car starts from rest and has an acceleration of 1.5 m/s². A second car has an initial velocity of 18 m/s and a retardation of 1.0 m/s². After how many seconds are they moving with the same velocity?

(7 marks)

(c) If a lift having a total mass of 1.5 t travels a vertical distance from the ground to the tenth floor in 15 s and the distance between floors as 3.5 m, calculate the average power required.

(6 marks)

Question 6

As shown in *Figure 3*, weight D is suspended by a rope wrapped around pulley C. Pulleys B and C are fastened together and pulley A is belt-driven by pulley B. Starting from rest, weight D drops 15 m in 2.5 seconds. For each pulley, determine

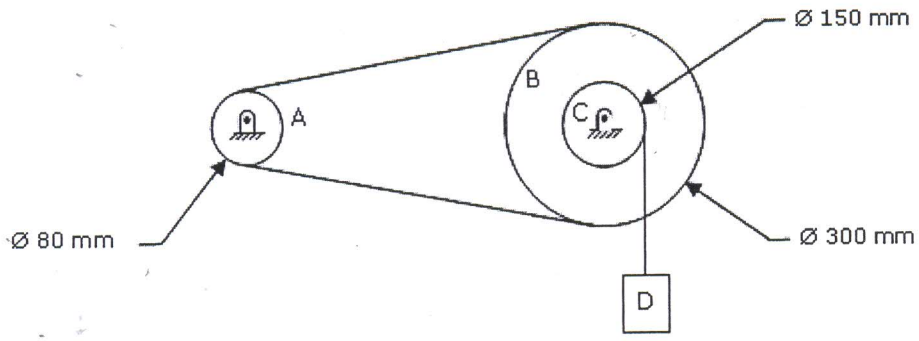

Figure 3

(a) the number of revolutions

(8 marks)

(b) the angular velocity and

(6 marks)

(c) the angular acceleration

(6 marks)

END OF QUESTION