



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JULY 2010 SESSION

SUBJECT CODE : FMB 10202
SUBJECT TITLE : DYNAMICS
LEVEL : BACHELOR
TIME / DURATION : 9.00 am – 11.30 am
(2.5 HOURS)
DATE : 21 NOVEMBER 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 one (1) section only. Answer **ANY** four (4) questions.
6. Answer all questions in English **ONLY**.

THERE ARE 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

INSTRUCTION: Answer ANY four (4) questions.

Please use the answer booklet provided.

Question 1

- (a) Explain and define (in terms of basic equations) the following terms:-
- Normal components
 - Tangential components
- (6 marks)
- (b) A particle moves on a linear path by starting from rest and increasing its speed to 100 km/hr in 30 seconds, before coming to a stop 15 seconds later.
- Sketch the particle's velocity-time curve.
(5 marks)
 - Calculates the particle's acceleration in the initial 10 s of its motion.
(5 marks)
 - Find the distance covered by the particle after 40 s.
(4 marks)
 - Determine the total time taken for the particle to cover a distance of 2 km.
(5 marks)

Question 2

- (a) A particle moves on a vertical line with an acceleration of $a = 10^3 \sqrt{v}$. When $t = 5$ s, its displacement $s = 50$ m and its velocity $v = 25$ m/s. Determine the displacement, velocity and acceleration of the particle when $t = 10$ s.
(15 marks)

- (b) A ball is thrown vertically upwards with a velocity of 200 m/s. Ten seconds later a second ball is also thrown vertically upwards with a velocity of 300 m/s. Calculate the distance above the ground where both the balls would probably meet.

(10 marks)

Question 3

- (a) A particle describes the path $y = 16x^2$ with constant speed v (where x and y are in meters). Find the normal component of the acceleration.

(10 marks)

- (b) A particle describes a path of $10x^2$ (where x and y are in meters). The velocity has a constant x component of 5 m/s and the particle is at the origin at the start of the motion. Find the components of displacement, velocity and acceleration (in terms of time).

(15 marks)

Question 4

A particle moves on a path with a velocity vector of $v = (6t^2 \mathbf{i} - 7t \mathbf{j} + 8\mathbf{k})$ m/s.

- (a) Determine the coordinates of its position after 5 s.

(8 marks)

- (b) Determine the equation of its path.

(9 marks)

- (c) Determine the projection of the velocity vector in the direction of the vector $n = (4\mathbf{i} + \mathbf{j} - 3\mathbf{k})$ when $t = 3$ s.

(8 marks)

Question 5

(a) Define and explain the following terms: -

- i. potential energy
- ii. kinetic energy.

(12 marks)

(b) An object rolling with an initial velocity of 55 m/s, goes up a plane inclined 45° to the horizontal. Calculate the maximum distance the object can roll up the plane.

(13 marks)

END OF QUESTION