



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
JULY 2010 SESSION**

SUBJECT CODE : FMB 10102
SUBJECT TITLE : STATICS
LEVEL : BACHELOR
TIME / DURATION : 4.00pm – 6.00pm
(2.0 HOURS)
DATE : 10 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 **TWO (2)** sections. Section A and B. Answer all questions in Section A. For Section B, answer question 11 (compulsory) and another **TWO (2)** questions.
6. Answer all questions in English.

THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Find the magnitude and direction of the vector $(5\mathbf{i} + 12\mathbf{j})$ units.

(4 Marks)

Question 2

Given $\mathbf{a} = (3\mathbf{i} + 2\mathbf{j})$ and $\mathbf{b} = (5\mathbf{i} - 6\mathbf{j})$, find the resultant of \mathbf{a} and \mathbf{b} .

(4 Marks)

Question 3

Find the magnitude of the resultant of the forces shown in figure 1, and the angle that the resultant makes with the larger force **by using scale drawing** and **by calculation**.

(4 Marks)

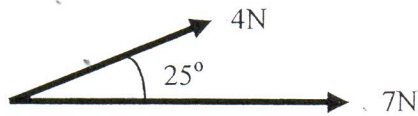


Figure 1

Question 4

Given that the system of forces shown in the diagram (figure 2) is in equilibrium, sketch the triangle of the forces and hence calculate the magnitude of the force X and the angle α .

(4 Marks)

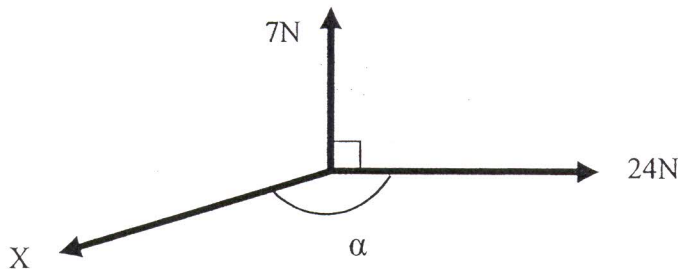


Figure 2

Question 5

Calculate the maximum frictional force which can act when a block of mass 2 kg rest on a rough horizontal surface , the coefficient of friction between the surface being (a) 0.7 and (b) 0.2

(4 Marks)

Question 6

A rod AB in figure 3 is free to rotate about an axis through the point O, perpendicular to the plane on which the rod rests. Forces of P and Q newtons act as shown. Find the combined turning effect about the point O of these forces if,

- (a) $P = 6\text{N}$ and $Q = 5\text{N}$,
- (b) $P = 7\text{N}$ and $Q = 3.5\text{N}$

(4 Marks)

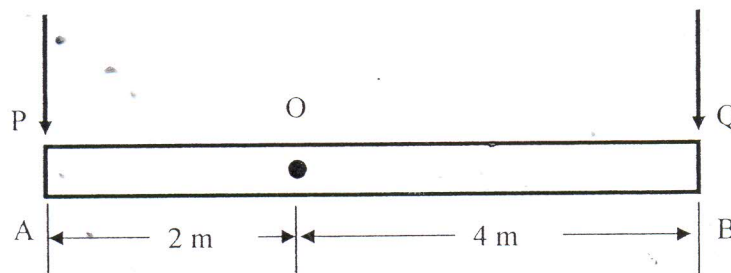


Figure 3

Question 7

Find the coordinate of the centre of gravity of the given system of particles, Figure 4.

(4 Marks)

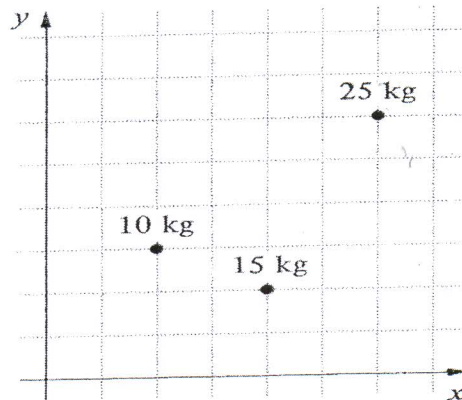


Figure 4

Question 8

Write down the definition in statics for

- (a) Rigid body
- (b) Particle
- (c) Concentrated force

(4 Marks)

Question 9

Write down any **two (2)** Newton's Laws that you know.

(4 Marks)

Question 10

Write down the SI unit and its symbol for length, mass and time.

(4 Marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer question 11 (compulsory) and another two (2) questions.
Please use the answer booklet provided.

Question 11

A force F is applied at a point in a body as shown in figure 5.

- Determine the x , y and z scalar components of the force.
- Express the force in **Cartesian vector** form.

(20 Marks)

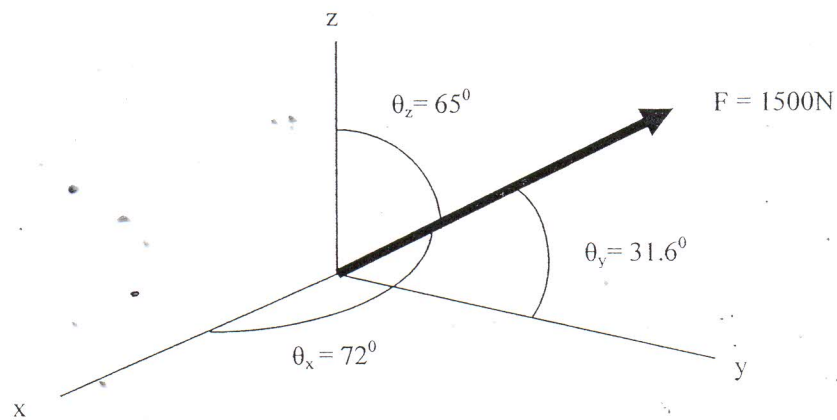


Figure 5

Question 12

Determine the magnitude of the resultant R and the angle θ between the axis and the line of action of the resultant in figure 6.

(20 Marks)

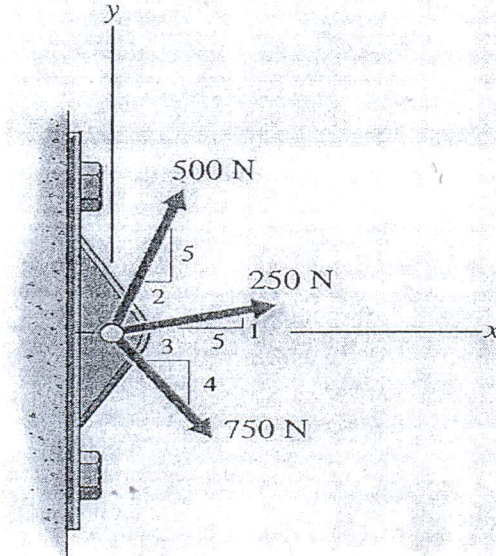
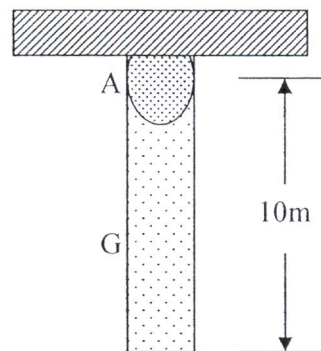


Figure 6

Question 13

- a) The moment of inertia of the 4kg disk about slender rod about an axis passing through its mass centre is determine from $I_G = (1/12) mL^2$. Apply the parallel-axis theorem in order to determine the moment of inertia about an axis passing through the pin at A.

(10 Marks)



$I_A = ?$

Figure 7

- b) The moment of inertia of the 20kg disk about an axis passing through its mass centre is $I = mr^2/2$. Determine the moment of inertia of the disk about an axis passing through the pin at A.

(10 Marks)

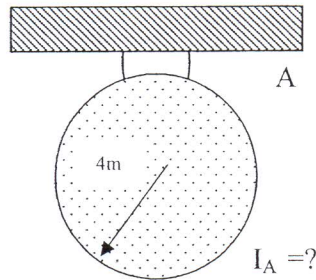


Figure 8

Question 14

Determine the moment of the 225N force shown in figure 5 about point A, B and C.

(20 Marks)

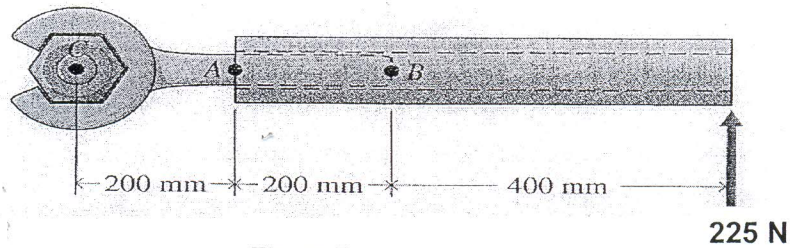


Figure 5

END OF QUESTION