SET B

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JULY 2010 SESSION

SUBJECT CODE	:	FGB 41103
SUBJECT TITLE	:	ADVANCED MANUFACTURING TECHNOLOGY
LEVEL	:	BACHELOR
TIME / DURATION	:	9.00am – 11.30am (2.5 HOURS)
DATE	:	20 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. Answers 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 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

Point Y is located at a coordinate (5,15,5) in xyz coordinate system. By using Homogeneous Transformation Matrix (HTM), find the new location of point Y if :

(a)   point Y is translated 12 points along x-axis

(3 marks)

(b)   point Y is translated 18 points along z-axis and then rotated for 115^0 along y-axis

(5 marks)

(c)   point Y is rotated for 79^0 in the x-axis and then rotated for 65^0 in the y-axis

(7 marks)

Question 2

Develop the element stiffness matrices and system equation for the plane truss as shown in *Figure 1* below. The stiffness constant for M1 and M2 are equal to 15000 N/m And the stiffness constant for M3 is equal to 20000 N/m. Use the numbering scheme indicated for your calculation. The force applied is 100N downward.
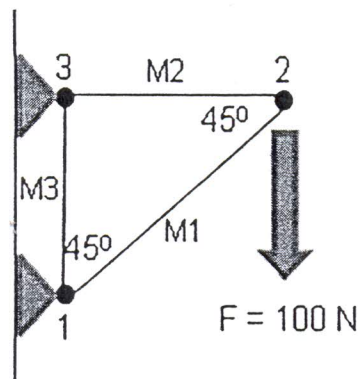

Figure 1

(a)   Find the local and global stiffness matrix.

(12 marks)

(b)   Find the displacement, *u* for each point.

(7 marks)

(c)   Reaction force, *f* for each point.

(6 marks)

SECTION B (Total: 60 marks)

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

Question 3

The manufacturing of Integrated Circuit (IC) is involving advance technology. One package of IC can consist of hundreds, thousands or million microscopic electronic devices that have been fabricated and electrically interconnected within the surface of a silicon chip.

(a)   List two main contaminations in IC processing and explain each of them

(8 marks)

(b)   Explain the two processes involve in the preparation of shaping silicon into wafers

(6 marks)

(c)   The process of mounting ICs on printed circuit board is depending on the shape of the lead on the ICs. List and draw two kind of lead on IC.

(6 marks)

Question 4

Group of Technology (GT) approach can help a company to produce many different kind of parts in one factory.

a)   What is meant by GT?

(2 marks)

b)   Explain 3 benefit in GT

(6 marks)

c)   Explain 3 difficulties in GT

(6 marks)

d)   There are many types of Machine Cell Design. List 2 of them and briefly explain

(6 marks)

Question 5

A flexible machining system consists of two machining workstations and a load/unload station as described in Table 1. Station 1 is the load/unload station. Station 2 performs milling operations and consist of two servers (two identical CNC milling machines). Station 3 has one server that performs drilling (one CNC drill press). The stations are connected by a part handling system that has four work carriers. The mean transportation time is 2.0 min. The FMS produce 2 parts X and Y. The part mix fraction and process routing for the two parts are presented in the table below. The operation frequency f_{ijk} = 1.0 for all operations. Determine :

Part j	Part Mix pj	Operation k	Description	Station i	Process time t_{ijk} (min)
		1	Load	1	4
X	0.4	2	Mill	2	20
		3	Drill	3	12
		4	Unload	1	2
		1	Load	1	4
Y	0.6	2	Mill	2	30
		3	Drill	3	12
		4	Unload	1	2

Table 1

(a)   Maximum production rate of the FMS

(8 marks)

(b)   Corresponding production rate of each product

(6 marks)

(c)   Utilization of each station

(6 marks)

Question 6

Rapid Prototyping (RP) method can be classified into different categories based on the starting material in the RP process

(a)   Name 3 classification methods in RP and 1 example for each method. In each example, state the starting material condition.

(6 marks)

(b)   Droplet Deposition Manufacturing (DDM) is one of the methods in RP

(i)   Draw the DDM diagram.

(4 marks)

(ii)   Label the 6 key components in the above diagram.

(6 marks)

(iii)   Briefly explain how this system works.

(4 marks)

END OF QUESTION