



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2011 SESSION

SUBJECT CODE : FGB 41103
SUBJECT TITLE : ADVANCED MANUFACTURING TECHNOLOGY
LEVEL : BACHELOR
TIME / DURATION : 3.00pm – 5.30pm
(2.5 HOURS)
DATE : 13 MAY 2011

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 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

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

Question 1

Concurrent Engineering (CE) is a systematic approach to the integrated, concurrent design of products and their related processes, including manufacturing and support.

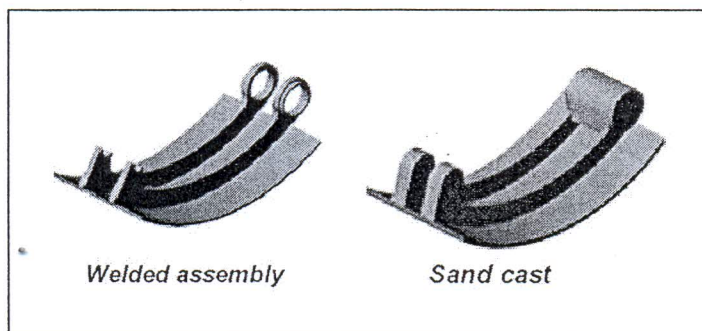


Figure 1

- (a) Figure 1 shows two kinds of processes to produce brake shoes. Which process is more economical? Explain 3 categories of factors to support your answer. (6 marks)
- (b) The success of CE activities is supported by enabling technologies such as CAE. Base on your understanding explain 3 reasons why CAE is important in CE. (6 marks)
- (c) Explain 2 differences between recycle and remanufacturing? (3 marks)

Question 2

Develop the element stiffness matrices and system equation for the plane truss as shown in *Figure 2* below. Assume the stiffness of each element is constant. Use the numbering scheme indicated. All elements have different stiffness (AE/L). Stiffness for M1 is 20,000 N/m, M2 is 15,000 N/m and M3 is 25,000 N/m. A 200N force is applied at point 2 to the direction indicated in figure 2.

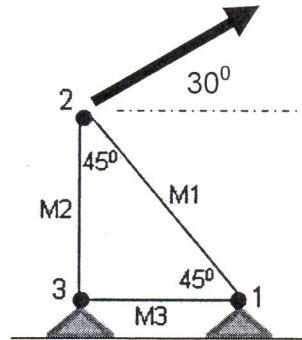


Figure 2

- (a) Find the local and global stiffness matrix for the above (12 marks)
- (b) The use of CAD is very important in the new product development. Explain 3 reasons why CAD system is very important in the new model introduction (6 marks)
- (c) CAD can be classified into 3 categories, Hardware, Application and Modeling method. Using your own words, explain these 3 categories (6 marks)

SECTION B (Total: 60 marks)**INSTRUCTION: Answer only THREE questions.****Please use the answer booklet provided.****Question 3**

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) Laminated Object Manufacturing (LOM) is one of the methods in RP

- (i) Draw the LOM diagram.

(4 marks)

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

(6 marks)

- (iii) Briefly explain how this system works.

(4 marks)

Question 4

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:

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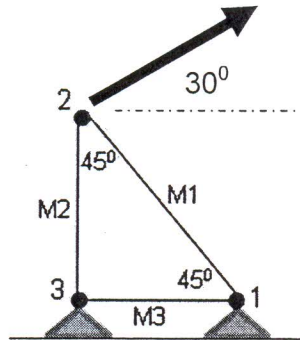


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Part j	Part Mix p_j	Operation k	Description	Station i	Process time t_{ijk} (min)
X	0.4	1	Load	1	5
		2	Mill	2	20
		3	Drill	3	15
		4	Unload	1	3
Y	0.6	1	Load	1	5
		2	Mill	2	25
		3	Drill	3	10
		4	Unload	1	3

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 5

Reverse engineering (RE) is widely practiced in the current development of new products. This activity is normally carried out before the Prototype stage of any new development of a new product.

- (a) Give 3 reasons the benefit of RE in current new product development. (6 marks)
- (b) Why Reverse Engineering is important? Give 3 reasons and explain. (4 marks)
- (c) Explain the differences between Re-Engineering and Reverse Engineering? (4 marks)
- (d) One of the results for RE is the introduction of DLNA. Explain the purpose of the introduction of DLNA (Digital Living Network Alliance) (6 marks)

Question 6

Fabrication of Integrated Circuit (IC) is becoming a very important industry. This process involves many stages of processes.

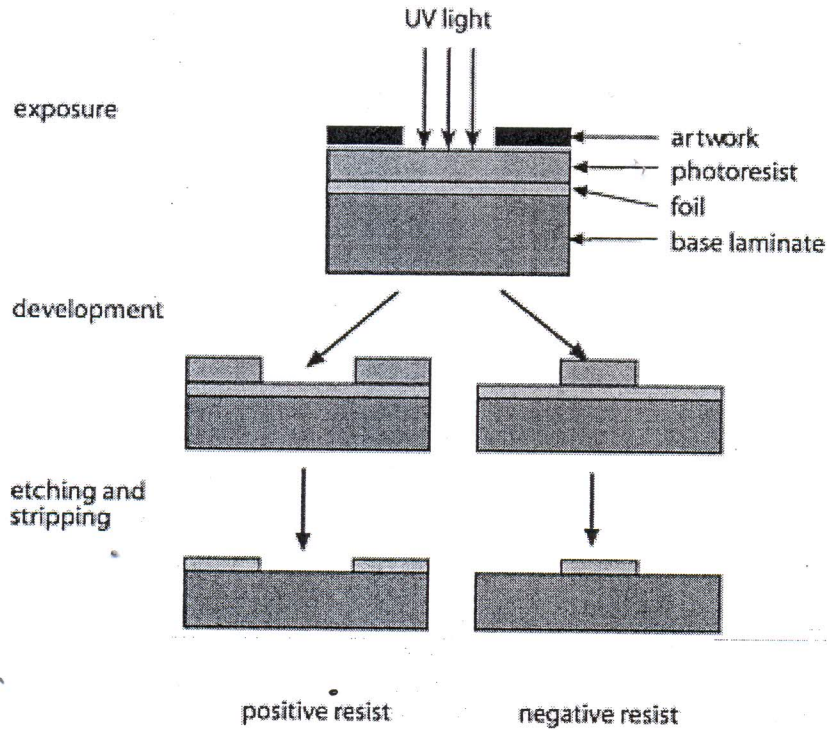


Figure 3: IC Fabrication Process

- (a) Shaping of silicon into wafers is involving 3 main steps. List these steps
(6 marks)
- (b) Name the process shown in figure 3 above? Explain the processes of positive & negative resist
(8 marks)
- (c) Differentiate between Proximity Printing and Contact Printing for the above type of process. Give 3 different points only.
(6 marks)

END OF QUESTION