



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE : FGB 41103
SUBJECT TITLE : ADVANCED MANUFACTURING TECHNOLOGY
LEVEL : BACHELOR
TIME / DURATION : 9.00 am – 11.30 am
(2 ½ HOURS)
DATE : 26 APRIL 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 two (2) questions only.
6. Answer all questions in English.

THERE ARE 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Develop the element stiffness matrices and system equation for the plane truss as shown in *Figure 1* below. Assume the stiffness of each element is constant. Use the numbering scheme indicated. All elements have a constant AE/L which is equal to 20,000 N/m. Both angles are 45° , force applied is 100 N to the right.

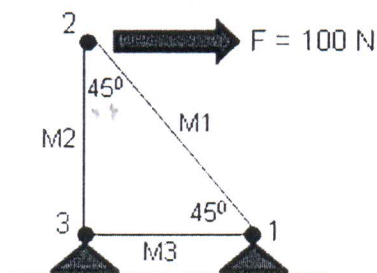


Figure 1

- (a) Find the local and global stiffness matrix. (12 marks)
- (b) Find the displacement, \mathbf{u} for each point. (7 marks)
- (c) Reaction force, \mathbf{f} for each point. (6 marks)

Question 2

Reverse engineering is a very important activity in developing new products. This activity is normally carried out before the Prototype stage of any new development of a new product.

- (a) Explain what is meant by Reverse Engineering. (5 marks)
- (b) Why Reverse Engineering is important? Give 3 reasons and explain. (5 marks)

- (c) Reverse Engineering can be applied in many engineering fields. Give 4 engineering fields that Reverse Engineering can be applied.

(5 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer only TWO 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.

(9 marks)

- (b) Solid Ground Curing is one of the methods in RP

(i) Draw the Solid Ground Curing diagram.

(6 marks)

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

(6 marks)

(iii) Briefly explain how this system works.

(9 marks)

Question 4

Concurrent Engineering is an approach which is the opposite of 'Water Fall' or 'Sequential' approach.

- (a) Using your own word explain what is meant by concurrent engineering. (5 marks)
- (b) Give 4 examples of Design for X (DFX) under Design for Manufacturability category. Draw the shape of the parts for each example to show how they can ease the manufacturing process. (16 marks)
- (c) Explain why CE is important. Give 3 reasons and explain each of them. (9 marks)

Question 5

Point Y is located at a coordinate (16,17,10) in xyz coordinate system. By using Homogeneous Transformation Matrix (HTM), find the new location of point Y if :

- a) point Y is translated 8 points along x-axis and translated 5 point along z-axis (4 marks)
- b) point Y is translated 3 points and then rotated 80° along y-axis. (10 marks)
- c) point Y is rotated 55° in the x-axis and then rotated 105° in the y-axis. The final location of point Y is then mirror at xz plane. (12 marks)
- d) point Y is rotated 145° in the z-axis. (4 marks)

END OF QUESTION