



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JULY 2010 SESSION

SUBJECT CODE : FGB 40103
SUBJECT TITLE : JIGS & FIXTURES DESIGN
LEVEL : BACHELOR
TIME / DURATION : 9.00am – 12.00pm
(3 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 THREE (3) questions only.
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

- (a) The main objective of tool design is to lower manufacturing cost while maintaining quality and increasing production. In order to accomplish this objective, determine the most important criteria that need to be fulfilled for a design. (3 marks)
- (b) Define and differentiate classes of fixtures that used for:
 i. Milling machine
 ii. Lathe machine (4 marks)
- (c) Bushings are used to locate and guide drills, reamers, tap, counterbores tools, and any other rotating tools used to make or modify a hole. Identify three (3) importance of bushing in jig and fixture application. (6 marks)

Question 2

- (a) Describe how the application of a jig and fixture may help in increasing *productivity* in a manufacturing operation. (3 marks)
- (b) Figure 1 (a), (b) and (c) are devices that frequently used with jig and fixtures. Describe the general application of those devices and identify the types of the devices shown

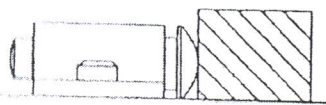


Figure 1 (a)



Figure 1 (b)

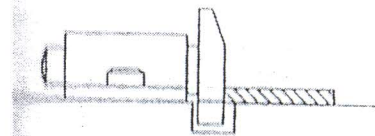


Figure 1 (c)

(5 marks)

- (c) Identify and differentiate the types of bushing shown in Figure 2 (a), (b) and (c) in terms of its application with jig and fixture.

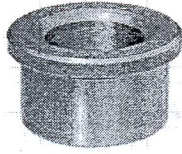


Figure 2 (a)



Figure 2 (b)



Figure 2 (c)

(6 marks)

Question 3

- (a) Labor is the single most expensive factor in manufacturing. Clarify how the use of jig and fixture may help in reducing cost of *labor expenses*.
(3 marks)
- (b) In designing a tool, besides have to ensure the design meets adequate quality; costs also have to be considered. List and define costs that need to take into consideration when performing an *economic analysis*. State reasons on that.
(6 marks)
- (c) Define the meaning of *ergonomic design* and determine why it is important to consider ergonomics during design phase of a tool.
(4 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions only.

Please use the answer booklet provided.

Question 4

(a) *Power clamping* is a type of clamp that frequently used in production. Define the advantages and disadvantages of this type of clamp. (4 marks)

(b) The main function of a clamp is to hold a part against the locators during the machining cycle. Classify and differentiate the clamps shown in Figure 3 (a) and (b).

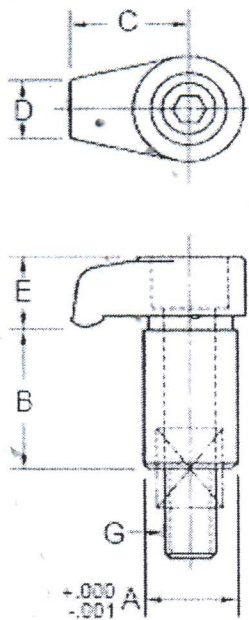


Figure 3(a)

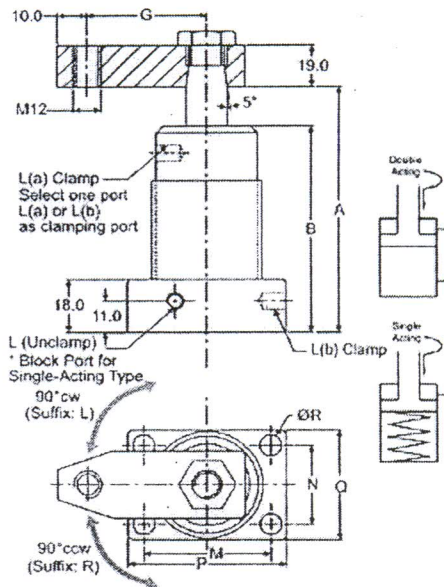


Figure 3(b)

(6 marks)

(c) Explain in what condition a *non-mechanical clamping* should be used and identify the two (2) principle forms of non-mechanical clamping used in manufacturing production. (6 marks)

(6 marks)

(d) Define *Welded* tool bodies and describe the advantages and disadvantages as a jig or fixture body. (4 marks)

(4 marks)

Question 5

- (a) Briefly discuss the importance of *economic design principles* for tool designer. And, briefly analyze how the following principles may help in cost reduction
- i. Use of preformed material
 - ii. Use of standard component

(5 marks)

- (b) Develop comparative analysis of the alternatives below.

A total of 500 flange plates require four holes accurately drilled 90 degrees apart to mate with a connector valve. The tool designer has determined three possible alternatives:

1. Have a machinist who earns RM 10 per hour laid out and drill each part at a rate of 2 minutes per part.
2. Use a template jig, capable of producing 50 parts per hour and costing RM 18, in the production department, where an operator earns RM 6.50 per hour.
3. Use a duplex jig, which costs RM 37.50 and can produce a part every 26 seconds, in the production department, where an operator earns RM 6.50 per hour.

Which alternative should the tool designer select as the most efficient and economical? How much is actually saved and the break-even point?

(15 marks)

Question 6

Refer to the Figure 4 to answer question 6 (a), (b), (c), and (d).

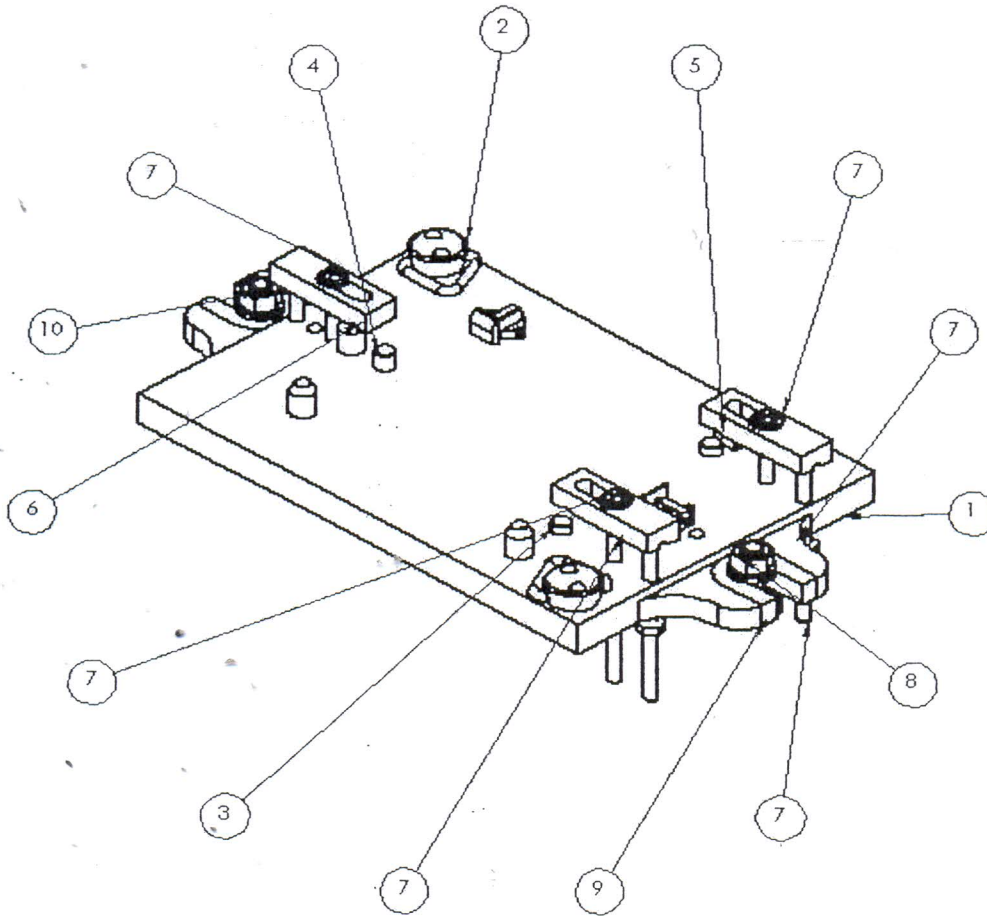


Figure 4: Plate Fixture

- (a) According to the plate fixture illustrated in Figure 4, explain why the components no.3 and no.4 significant to this assembly fixture?
(6 marks)
- (b) Elaborate how would you decide this plate fixture is capable doing its work?
(5 marks)
- (c) Name and describe the function of the component no.2.
(4 marks)
- (d) What would be happen if replace all component no.5 with component no. 6?
(5 marks)

Question 7

- (a) Discuss three (3) types of jig and fixture used for welding operation. (8 marks)
- (b) Explain the inspection fixtures that basically used to ensure part quality and conformity to dimension. And, briefly describe two (2) general types of inspection fixture. (7 marks)
- (c) List five (5) objectives of jig and fixture design for welding operations. (5 marks)

END OF QUESTION