Document No : UniKL MFI_SD_AC41
Revision No: 02
Effective Date: 01 December 2008

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2011 SESSION

SUBJECT CODE	:	FMB 15103
SUBJECT TITLE	:	PRODUCT DESIGN AND DEVELOPMENT
LEVEL	:	BACHELOR
TIME / DURATION	:	9.00am – 11.30am (2.5 HOURS)
DATE	:	03 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 FIVE (5) questions. Answer FOUR (4) questions only.
6. Answer all questions in English.
7. Formula sheet is appended.

THERE ARE 4 PAGES OF QUESTIONS AND 1 PAGE OF APPENDIX, EXCLUDING THIS PAGE.

INSTRUCTION: Answer only FOUR questions.

Please use the answer booklet provided.

Question 1

(a) Explain why market research is important before a new product is to be designed?

(5 marks)

(b) During market research, what kind of information that you need to know about your competitors?

(5 marks)

(c) Define the concept of Quality Function Deployment (QFD). Discuss the benefit of employing QFD in the design stage.

(5 marks)

(d) Give one example of using QFD in identifying customer needs. You must support your answer with mock up data and tables. (Hint: identify customers, requirements and constraints)

(10 marks)

Question 2

(a) Explain how the concept of Design for Manufacture and Assembly can help in reducing manufacturing cost. You may supplement your answers with sketches or diagrams.

(10 marks)

(b) Mr. Ali has a new product which can be either manufactured via automated process, cellular manufacturing or job shop. Each method of manufacture has difference fixed cost and per unit cost as listed in Table 1. Determine which manufacturing process is the most economical for a production volume of 10000 units per year.

	Automated Process	Cellular Manufacturing	Job Shop
Annual volume required	10000	10000	10000
Fixed cost per year	RM110 000	RM 80 000	RM 75 000
Variable cost per year	RM 2.00	RM 4.00	RM 5.00

Table 1 Cost for Various Type of Manufacture

(10 marks)

(c) What volume should job-shop manufacturing is to be preferred?

(5 marks)

Question 3

(a) Based on the concept of Design for Safety, define the following terms:

(i) Risk tolerance
(ii) Hazard assessment
(iii) Mitigation
(iv) Risk analysis
(v) Risk management

(10 marks)

(b) Redundancy is good for safety but at an added cost. Give examples of situations where the benefit of redundancy will far out weight the cost factor.

(6 marks)

(c) Explain the three steps involved in risk management plans.

(9 marks)

Question 4

(a) Explain the concept generation process as shown in the Figure 1.

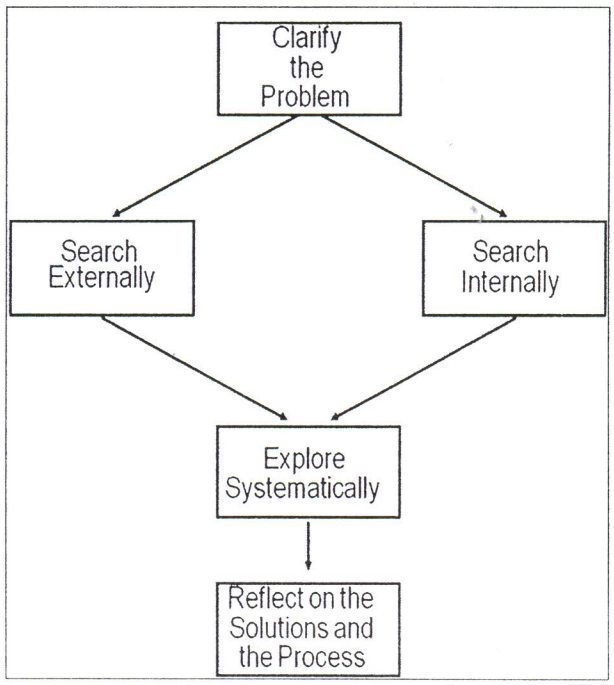

Figure 1 Concept Generation Process

(15 marks)

(b) Explain the benefits of benchmarking similar or related product during the concept generation process

(5 marks)

(c) You are designing a new skate board. Construct a Morphological Chart based on Table 2.

	1	2	3
Body Material			
Colour			
Safety Features			
Assembly			

Table 2 Morphological Chart for a New Skate Board Design

(5 marks)

Question 5

(a) Sketch the front, top and right drawings for the part in Figure 2.

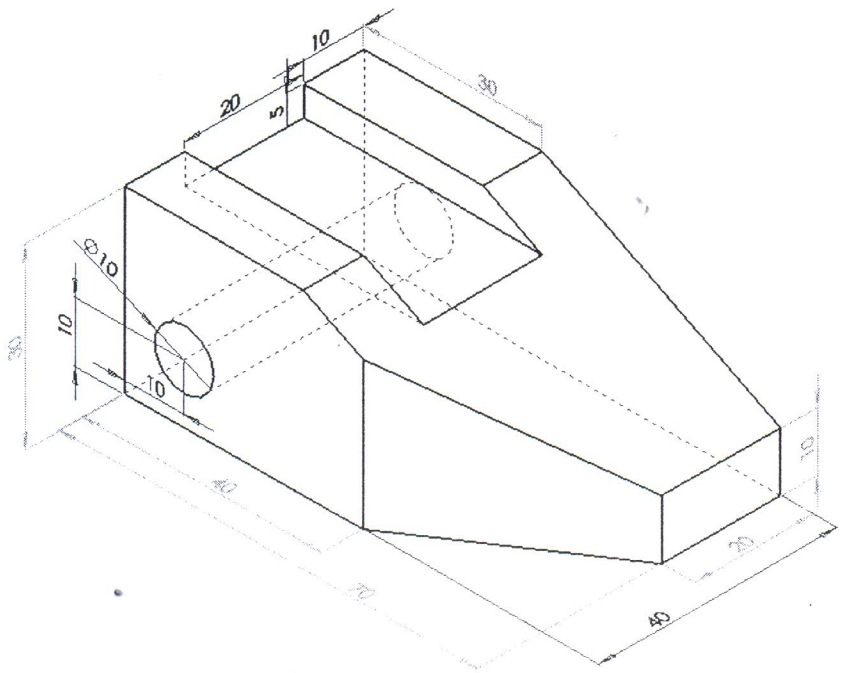

Figure 2 Three Dimensional Part

(9 marks)

(b) List down the method of manufacturing suitable to create the part in Figure 2. Give at least three examples.

(6 marks)

(c) Explain why sustainable design is essential to preserve the environment.

(6 marks)

(d) Give two examples of sustainable design.

(4 marks)

END OF QUESTION

APPENDIX

Break event analysis

p = selling price per unit

v = variable cost per unit

FC = total fixed cost per period

TVC = total variable cost per period

C = contribution per period

Q = number of units produced/sold per period

P = pretax profit per period

TR = total revenue per period

TC = total cost period

c = contribution per unit

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1. TR = pQ
2. C = p – v
3. C = Q(p – v) = TR – vQ = FC + P
4. TC = FC + TVC
5. TVC = vQ
6. P = TR – TC = pQ – (FC + vQ)
7. Q = (P + FC) / (p – v)

At break-even (P = 0)

8. FC = pQ – vQ = Q(p – v)
9. Q = FC/(p – v)
10. TVC = TR – FC = pQ – FC
11. v = (TR – FC)/Q = (pQ – FC)/Q = p – FC/Q
12. TR = FC + TVC = FC + vQ
13. p = (FC + vQ)/Q = FC/Q + v