NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

B-Eng Hons Industrial and Manufacturing Engineering

Main Examination

COURSE	**:**	**CONCURRENT ENGINEERING I**
CODE	**:**	**TIE 3119**
DATE	**:**	**JANUARY 2013**
DURATION	**:**	**3 HOURS**

INSTRUCTIONS AND INFORMATION TO CANDIDATE

1. Answer **Four** Questions.
2. This paper contains Five **(5)** questions.
3. There are four **(4)** printed pages.

QUESTION 1

a) Define the following terms in relation to product research and development (R&D).
   i. Globalization [1]
   ii. Product Life [2]
   iii. Product Family [2]
   vi. Mass Customization [2]

b) Identify and briefly explain five characteristics of a competitive product. [10]

c) Figure Q1 below shows product development classification into four quadrants. Explain the trends shown in terms of the risk involved and economic impact. [8]

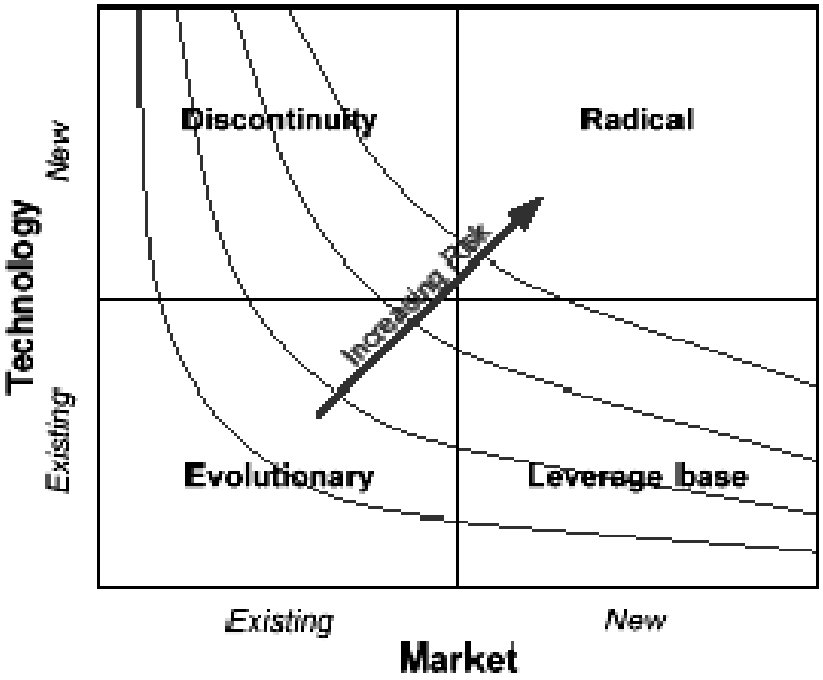

Figure Q1: Product Development Classification

QUESTION 2

a) Define the term "Product Platform". [2]

b) Explain what is meant by "Variant or Derivative" products, giving two ways in which that can be achieved. [3]

c) Identify three tactics which can be used to gather the customer's voice during early stages of product development. [3]

d) The Quality Function Deployment (QFD) method can be used to deploy the customer's voice into technical specifications. Identify and briefly explain each of the four phases of the complete QFD method. [12]

e) Explain how the "customer rating" and "engineering assessment" matrices are completed on the first QFD matrix and also give their relevance to the product development process. [5]

QUESTION 3

a) Figure Q3 shows a product development process.

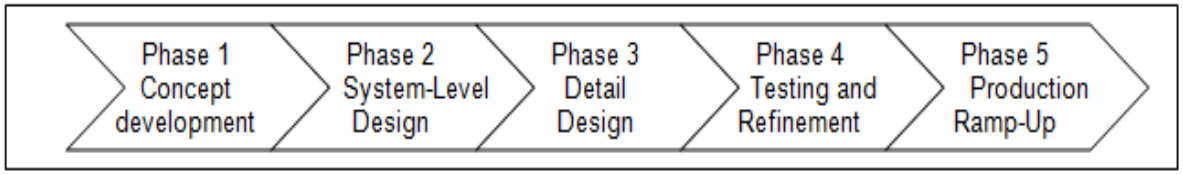

Figure Q3: Product development process

i. State the roles of the design and manufacturing teams at each stage of the product development process. [10]

ii. With the aid of a manufacturability system model, explain what you understand by concurrent engineering. [5]

b) Define mission statement as used in concept development during new product design. [2]

c) Identify your own new product design project and produce a detailed mission statement, showing the crucial elements of a design mission statement. [8]

QUESTION 4

a) Identify three general levels of modularity in the design of technology push products and illustrate their relationship by means of a diagram. [6]

b) All product activities involve changing the state known as "flow" of three basic quantities. Identify and illustrate the three basic quantities in the form of a diagram. [6]

c) According to the principles of Industrial Design, *"Good Design = Good Business = Good Culture"*. Basing on the above statement, what economic benefits can be achieved by local SMEs and also with reference to Fig Q4c identify design improvements which support the above statement. [6]

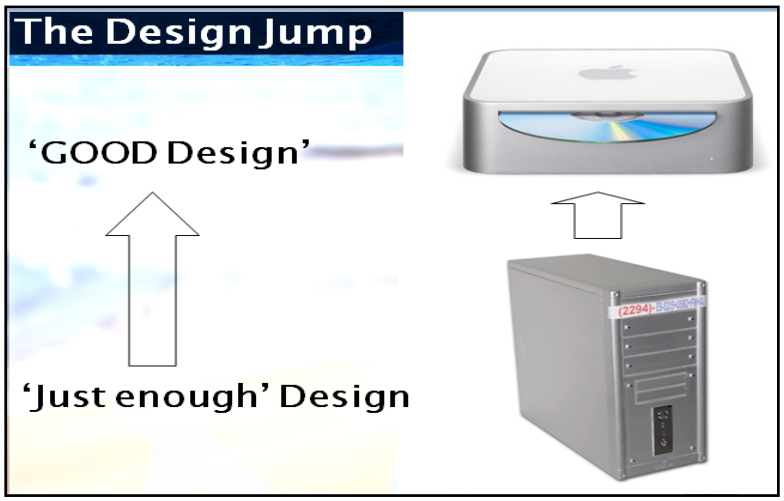

Fig Q4c: Design Jump

d) Fig Q4d below illustrates a collaborative product design system environment. From your own understanding of concurrent engineering, explain how the system supports concurrent product development. . [7]

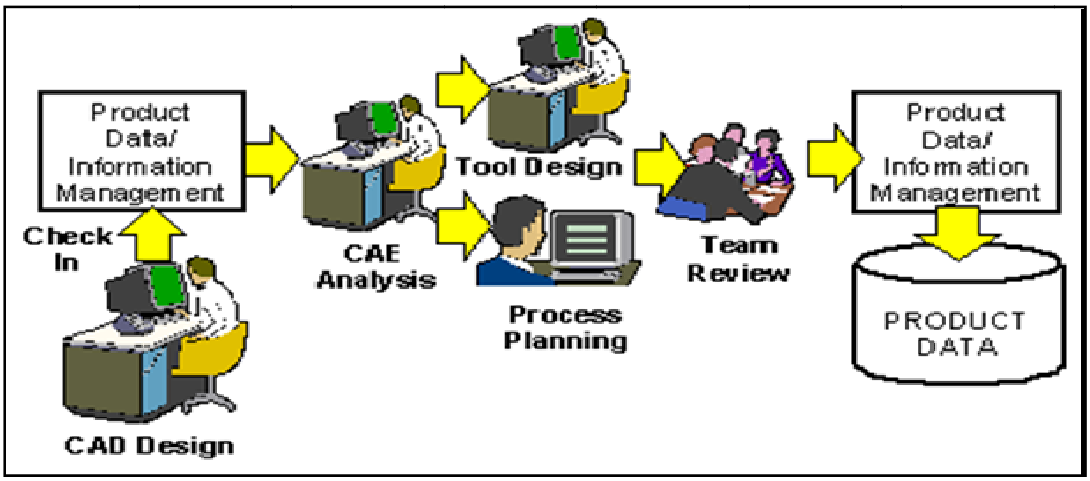

Fig Q4d: Collaborative design system environment

QUESTION 5

a) What are the common dysfunctions exhibited by development teams during concept generation. [6]
b) Discuss the concept screening methodology using a product of your own choice. [12]
c) Define the term *"Product Architecture"* [2]
d) What are the implications of degree of modularity to product architecture? [5]

END OF EXAM