



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

BACHELOR OF ENGINEERING (HONS) DEGREE INDUSTRIAL AND MANUFACTURING ENGINEERING

CONCURRENT ENGINEERING I

TIE 3119

Fist Semester Supplementary Examination Paper

August 2015

This examination paper consists of 4 pages

Time Allowed: 3 hours

Total Marks: 100

Special Requirements: N/A

Examiner's Name: N. Gwangwava

INSTRUCTIONS

1. Answer any four (4) questions
2. Each question carries 25 marks
3. Use of calculators is permissible

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5.	25
6.	25
TOTAL	100

Question 1

- a) Explain how the concurrent engineering approach to new product research and development can help to achieve each of the following characteristics of a competitive product:
- i. Product quality, [2]
 - ii. Product cost, [2]
 - iii. Development time, [2]
 - iii. Development cost, [2]
 - iv. Development capability. [2]
- b) Identify any new high technology features influencing the forward movement of home television sets. [5]
- c) Draw and clearly label the life cycle of a product and explain all the stages that the product passes through. [10]

Question 2

- a) Define the term “*Product*” [2]
- b) Products can be classified into two types. State and explain the two types, giving two examples of products that fall in each type. [8]
- c) In order to stay in business, companies normally adopt a strategy of launching various product portfolios which undergo through different life cycle stages at any given time. Explain, with the aid of graphs and product examples, the use of the stated strategy.[5]
- d) Define the term “Product Platform”. [2]
- e) Explain what is meant by “Variant or Derivative” products, giving two ways in which that can be achieved. [3]
- f) Identify and explain any three methods which can be used to gather the customer’s voice during early stages of product development. [5]

Question 3

a) Fig Q3a below shows different stages of manufacturing in the product life cycle.

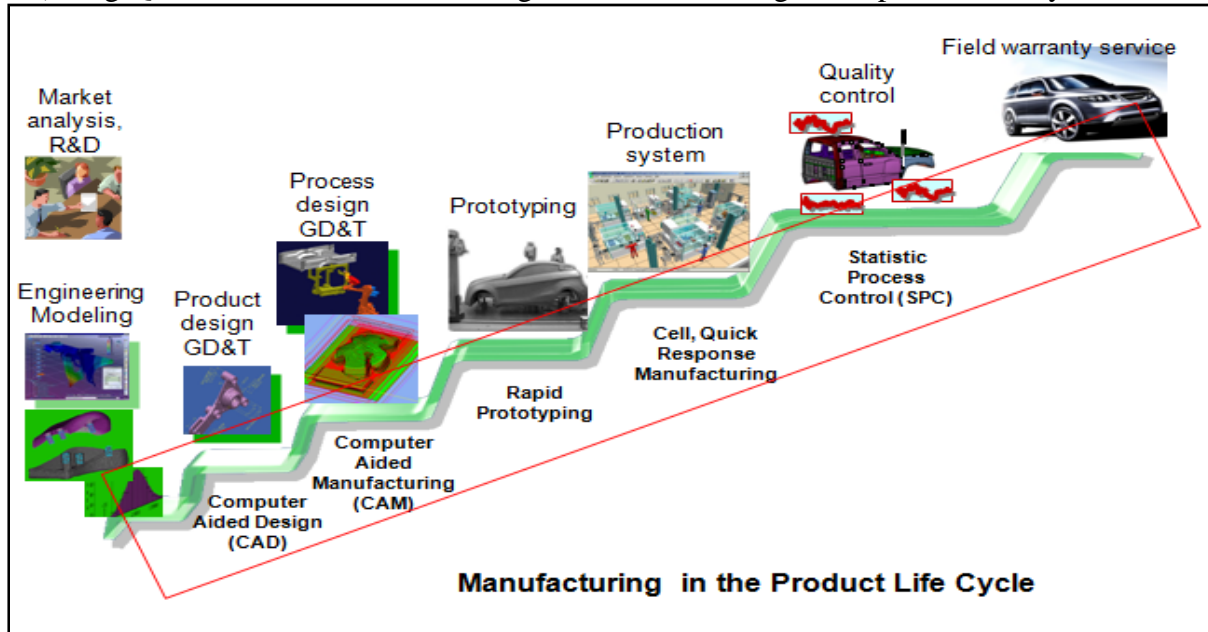


Fig Q3a: Stages of manufacturing in the product life cycle

Give a brief explanation of latest developments at each stage which enable the concurrent engineering design approach to reduce “Time-to-Market” [12]

b) A product concept is an approximate description of the technology, working principles, and form of the product. Concept generation usually follows a five step methodology. Using a flow chart, explain all the steps followed in the methodology. [13]

Question 4

a) Explain how the concept selection process is accomplished with reference to Figure Q4a below. [6]

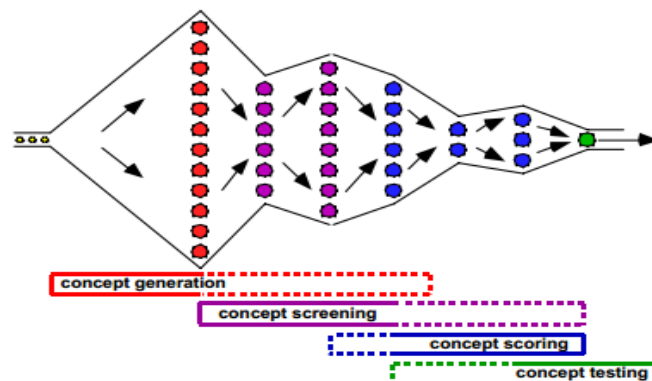


Figure Q4a: Concept Selection

- b) State and explain six methods of concept selection. [12]
- c) Propose a set of selection criteria for the choice of a battery technology for use in a portable computer [5]
- d) With experience, users of concept selection discover several subtleties. Discuss any two of these subtleties and point out areas of caution. [2]

Question 5

- a) Define the term “*Product Architecture*” [2]
- b) Discuss the four step methodology used in establishing the product architecture. [9]
- c) What are the implications of degree of modularity to product architecture? [5]
- d) 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. [9]

Question 6

- a) Identify the legal protection achieved by the following forms of intellectual property (IP);
 - i. Patents, [2]
 - ii. Copyright, [2]
 - iii. Design, [2]
 - iv. Trade mark, [2]
 - v. Plant breeder’s rights. [2]
- b) Explain the patenting process with the aid of a well labeled diagram. [10]
- c) Explain how the following forces drive innovation;
 - i. Environmental crises, [3]
 - ii. Health emergencies. [2]