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 : QUALITY SYSTEMS

CODE : TIE 6230

DATE : JANUARY 2013

DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Answer **two questions** from Section A and **two questions** from section B.
2. Each Question carries **25 marks**.
3. This paper contains six **(6)** questions (Three in each section)
4. There are six **(6)** printed pages.

SECTION A

QUESTION 1

a) Comment on the factors which affect product quality. [10]

b) The tastes of customers towards a product are dynamic, they change with time and exposure pursuing quality issues is like chasing a shadow, you will never catch up with it. Using material drawn from lectures discuss this statement if it reflects the view of your top management. [15]

QUESTION 2

Discuss the merits and demerits of applying the four quality organizing techniques, which are quality control, quality assurance, total quality management (TQM) and six sigma, which one would be the best for your organization? [25]

QUESTION 3

a) Discuss the common points and divergent points of the American quality gurus that have been covered in your quality course. How will these points affect the performance of your company? [13]

b) Discuss in detail the following problem solving techniques and tools
   a) Organizational techniques [4]
   b) System modeling techniques [4]
   c) Statistical tools. [4]

SECTION B

QUESTION 4

(a) Define AQL, α, LTPD, and β, showing their relationship on a typical OC Curve. [15]

(b) "In sampling for statistical control, balancing the risk of occurrence between Type I and Type II errors is a major consideration in determining the sample size and the control limits". Discuss this statement and explain how the notion affects delivery of quality? [10]

QUESTION 5

a) What are assignable and chance cause variation in a process? [4]

b) What are assignable causes of variation in a production process? [5]

c) Discuss the Central Limit Theorem using a normal distribution curve. [6]

d) A manufacturing process produces a certain part with a mean diameter of 200mm and a standard deviation of 0.07mm. The USL is 210mm and the LSL is 190mm. From this information, calculate the Process Capability Ratio (C_p) and the Process Capability Index (C_{pk}) [10]

QUESTION 6

a) Discuss Taguchi's principles under the following headings [15]

- Definition of Quality
- Robust Design
- Quality Loss Function

b) Discuss the nature of the relationship that exists in setting and maintaining tolerances for the Manufacturer, Retailer and Consumer's Tolerances. [10]

.....End of the Examination..