NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING ENGINEERING

Bachelor of Engineering Honours Degree Industrial and Manufacturing Engineering

2nd Semester Main Examination

COURSE : Quality and Reliability Engineering

CODE : TIE 2211

DATE : April/May 2014

DURATION : 3 Hours

INSTRUCTIONS AND INFORMATION FOR THE CANDIDATE

1. Answer any **five (5) questions**.
2. All questions carry **20 marks** each.
3. This paper contains **seven (7)** questions.
4. There are **three (3)** printed pages.

QUESTION 1

With reference to a product of your choice, clearly explain in detail, the definition of quality in terms of:

(a) Value (value based). [10]
(b) Service (service quality). [10]

QUESTION 2

(a) Give and explain five (5) benefits of measuring quality costs in an organisation. [10]
(b) With reference to quality gurus' views, explain the factors that can be used in improving quality in industry, giving examples of areas of improvement. [10]

QUESTION 3

(a) With reference to reliability in engineering, explain the following terms:
  (i) Maintainability. [6]
  (ii) Availability. [5]
  (iii) Failure. [3]
(b) Clearly explain what you understand by "Reliability Engineering". [6]

QUESTION 4

(a) Clearly outline and explain five important aspects of reliability engineering. [10]
(b) Give a detailed account of the role of reliability engineers. [10]

QUESTION 5

Clearly explain giving examples, the following quality problem solving tools and techniques:

(a) System modelling tools. [10]
(b) Organisational techniques. [10]

QUESTION 6

(a) Briefly explain what Failure Mode and Effect Analysis (FMEA) is. [2]
(b) Give five (5) objectives of Failure Mode and Effect Analysis. [5]
(c) With reference to products of your choice, in an organisation of your choice, explain giving practical examples, how you would carry out a Failure Mode and Effect Analysis (FMEA). [8]
(d) Give a detailed account of the application and use of the Ishikawa problem solving technique in quality problems. [5]

QUESTION 7

(a) What is the goal of maintenance prevention? [5]
(b) Give a brief account of five (5) objectives of maintenance prevention. [5]
(c) What is statistical process control (SPC)? [5]
(d) How and why is statistical process control (SPC) applied in a manufacturing environment? [5]

End of Examination