Chartered Quality Institute

CQI Examinations January 2015

Unit 303

Monitoring and Measuring for Quality (Level 3)

22 January 2015

Time: 9.40 – 12.10
(2½ hours)

Notes for candidates

At 9.30, you have 10 minutes preparation time before the exam begins.
Your exam booklet will be handed out at 9.40.

Attempt **ALL THREE questions** in **Section A.** Attempt **any TWO** questions from **Section B.**
If you attempt three or more questions in Section B, only the first two will be marked.

Questions may be attempted in any order. All questions carry equal marks.
The maximum marks for each part of each question are shown.

Begin each question at the top of a fresh side of paper.
Do not write in the margins.

If you use any additional sheets (graph paper or additional answer booklet) please write your CQI student number, examination name and date on each sheet.

SECTION A – ANSWER ALL QUESTIONS

QUESTION 1

Understanding the role of monitoring and measuring in making decisions relating to quality is central to satisfying customer requirements.

a) Explain what is meant by the quality principle factual approach to decision making.

(5 marks)

b) Define the following types of data and give **two** examples of each:

- Variable
- Attribute
- Subjective

(15 marks)

QUESTION 2

Sampling is often used when inspecting incoming goods.

a) Explain the difference between a single and double sampling plan and provide **one** advantage and **one** disadvantage for each.

(14 marks)

b) Draw and label the axis of an Operating Characteristics (OC) curve and mark on it the 5% consumer risk and 10% producer's risk, Acceptable Quality Level (AQL) and Lot Tolerance Process Defective (LTPD).

(6 marks)

QUESTION 3

Descriptive statistical measures can play an important role in the collection and the interpretation of quality control, process and production data.

a) Define the following statistical terms:

- Define the term central tendency
- Define the term mode
- Define the term median
- Define the term mean.

(12 marks)

b) The following times were recorded for the response of incoming calls to a call centre to the nearest minute:

13, 3, 3, 13, 3, 6, 11, 3, 4, 5, 5, 6, 11, 10, 2, 8, 9, 9, 10, 11

Showing all your workings, determine for the data set:

- The mode
- The median.

(8 marks)

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SECTION B – ANSWER TWO QUESTIONS ONLY

QUESTION 4

When collecting data, various statistical measures can be used to describe its spread – one such measure is called the standard deviation. The following data was collected from a production process (in cm):

12.1, 12.2, 12.2, 12.3, 12.3, 12.3, 12.4, 12.4, 12.5, 12.6

a) Showing all your workings, calculate the mean for this data.

(5 marks)

b) Showing all your workings, calculate the standard deviation for this data.

(15 marks)

QUESTION 5

The monitoring and recording of data can be achieved using a variety of techniques to analyse its performance, and is an essential part of a continuous improvement programme.

a) Explain what the function of the following charts are:

- Multi-vari charts
- Process control charts.

(10 marks)

b) Draw the following data distributions:

- Normal distribution
- Bi-modal distribution.

(4 marks)

c) Give **two** reasons why a bi-modal distribution can occur.

(6 marks)

QUESTION 6

Process variation can be monitored using Statistical Process Control (SPC) charts.

a) Draw an SPC chart showing the grand mean, and the upper and lower warning limits indicating their relative position in standard deviations from the grand mean.

(10 marks)

b) Explain **two** circumstances in which a control chart for attributes would probably be preferred to one for variables.

(10 marks)

QUESTION 7

When collecting data, a determination as to what and how much should be data collected has to be made. Discuss how the following can contribute to the achievement of quality goals:

a) Key performance indicators

(10 marks)

b) Staff Surveys.

(10 marks)