

Cork Institute of Technology

Higher Certificate in Science in Applied Biology – Award

(National Certificate in Science in Applied Biology – Award)

(NFQ – Level 6)

Summer 2005

Quality Control

(Time: 3 Hours)

Answer FIVE questions.

Attempt THREE from Section A and TWO from
Section B

Examiners: Ms. A. Ward

Dr. A. Furey

Prof. R. Fitzgerald

Section A

Q1. (Compulsory)

Subgroup No.	6:00	10:00	14:00	18:00	22:00
1	14	14.2	13.2	13.1	13.7
2	13.5	13.3	13.1	13.4	13.2
3	12.7	12.8	12.4	12.5	12.6
4	11.9	11.4	11.1	11.3	11.2
5	12.3	12.2	12.1	12.2	12.5
6	13.7	13.5	13.5	13.4	13.4
7	14.9	14.1	14.7	14.4	14.5
8	13.5	13.3	13.1	13.4	13.2
9	12.7	12.8	12.4	12.5	12.6
10	11.9	11.4	11.1	11.3	11.2
11	12.3	12.2	12.1	12.2	12.5
12	13.7	13.5	13.5	13.4	13.4
13	14.9	14.1	14.7	14.4	14.5
14	13.5	13.3	13.1	13.4	13.2
15	12.7	12.8	12.4	12.5	12.6
16	11.9	11.4	11.1	11.3	11.2
17	12.3	12.2	12.1	12.2	12.5
18	13.7	13.5	13.5	13.4	13.4
19	14.9	14.1	14.7	14.4	14.5
20	13.5	13.3	13.1	13.4	13.2
21	12.7	12.8	12.4	12.5	12.6
22	11.9	11.4	11.1	11.3	11.2
23	12.3	12.2	12.1	12.2	12.5
24	13.7	13.5	13.5	13.4	13.4
25	14.9	14.1	14.7	14.4	14.5

n	A₂	D₄
2	1.880	3.267
3	1.023	2.575
4	0.729	2.282
5	0.577	2.115
6	0.483	2.004
7	0.419	1.924

- (i) Using the data, construct an \bar{X} -R control chart. [15 marks]
- (ii) Briefly comment on the results and discuss the significance of any trends. [5 marks]

Q2. “Data collection is essential for ensuring a process is under control”.

Discuss this statement with reference to:

- (i) cause and effect diagrams,
- (ii) check sheets, and
- (iii) scatter diagrams.

How can data be represented in graphical form, and discuss the importance of proper sampling procedures.

NOTE: Use diagrams in your answers [20 marks]

Q3. Brainstorming and Affinity Diagrams are very important tools for solving quality problems.

- (i) Discuss the purpose for brainstorming in quality control and steps involved in conducting an effective brainstorming session. [7 marks]
- (ii) Discuss the use of affinity diagrams and the steps in constructing an affinity diagram. [7 marks]
- (iii) Give one example for each quality control tools [6 marks]

Q4. (a) With the aid of diagrams, discuss in detail the functions and differences between Pareto Diagrams and Histograms. [15 marks]

- (b) Discuss the trends that may emerge in histograms to indicate that there is a problem with the raw data collected from an industrial process. [5 marks]

Section B

- Q5. (a) Quality costs may be classified into the categories of failure and prevention costs.
Give two examples of each of these categories. (8 marks)
- (b) Each 1% Scrap was estimated to be 300euro/ week in a manufacturing company.
At 5% Scrap the Prevention costs were calculated to be 1500euro.
Using the relationship that: $\% \text{ Scrap} \times \text{Prevention Cost} = \text{Constant}$
Draw a graph showing how
(i) Prevention Costs and
(ii) Scrap Costs vary with increasing % Scrap.
Determine the most economical % Scrap from the graph for this manufacturing company.
(12 marks)
- Q6. Write short notes on **TWO** of the following:
(a) Quality audits
(b) Quality Manual
(c) Quality of design and the design process
(d) Training for quality (20 marks)
- Q7. Motivational techniques are important quality tool used in Quality Control.
Outline the principle of each of the following motivational techniques:
(a) Operator Control (10 marks)
(b) Quality Circles (10 marks)