

# Cork Institute of Technology

## Bachelor of Science in Applied Biosciences – Stage 2

(SBIOS\_7\_Y2)

Summer 2008

### Quality Management Systems & Biocomputing

(Time: 2 Hours)

Answer FOUR questions. Answer TWO  
Questions from Section A  
and  
TWO Questions from Section B

Examiners: Ms. A. Ward  
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Dr. T. Beresford

### Section A

- Q1. (a) A machine manufactures medicinal glass phials with specifications of  $10.80 \pm 0.2$  grams. Every hour a sample of four is taken and the masses determined. Over a period of ten hours the following results were recorded:

Hour	1	2	3	4	5	6	7	8	9	10
	10.71	10.74	10.76	10.80	10.80	10.83	10.83	10.92	10.95	10.99
	10.67	10.73	10.80	10.80	10.84	10.84	10.84	10.90	10.97	10.97
	10.72	10.71	10.75	10.78	10.82	10.82	10.86	10.87	10.94	11.01
	10.70	10.73	10.73	10.76	10.83	10.83	10.87	10.89	10.93	11.02

- (i) Draw average and range quality control charts drawn to specification limits. (20 Marks)

- (ii) Discuss the significance of your results. (5 Marks)

Sample Size	2	3	4	5	6
$A'_{0.025}$	1.51	1.16	1.02	0.95	0.90
$D'_{0.001}$	4.12	2.98	2.57	2.34	2.21

Q2. Write concise notes on:

- (a) Normal and non normal frequency distribution curves found in quality control systems. (12 Marks)
- (b) Quality control charts (13 Marks)

Q3. In order to estimate the process capability of a machine making resistors, the resistance of 1000 successive items from it were checked as follows:

Resistance in ohms	Number of Resistors
150.00 – 150.49	5
150.50 – 150.99	17
151.00 – 151.49	44
151.50 – 151.99	92
152.00 – 152.49	150
152.50 – 152.99	192
153.00 – 153.49	192
153.50 – 153.99	150
154.00 – 154.49	92
154.50 – 154.99	44
155.00 – 155.41	17
155.50 – 155.99	5

- (a) Plot the above data as
  - (i) Ordinary frequency distribution curve
  - (ii) Cumulative frequency distribution curve on arithmetic probability paper(15 Marks)
- (b) State whether the data appears to be normally distributed giving reasons. (5 Marks)
- (c) From the curves estimate the mean and standard deviations. (5 Marks)

## Section B

Q4. Write a brief overview of **TWO** of the following:

- (a) Customer Complaints System
- (b) Product Liability
- (c) Operator Control
- (d) Quality of Design (25 Marks)

Q5. (a) List **TWO** examples of each of the following quality cost categories:

- (i) Cost of conformance (5 Marks)
- (ii) Cost of non-conformance (5 marks)

(b) List three potential sources of data for quality cost reporting (3 Marks)

- (c) Each 1% of non-conforming product produced by a manufacturer costs \$ 2500 per week. At a non-conforming level of 5% the cost of conformance is \$2000 per week. Previous calculations on quality costs have confirmed the following:

$$\% \text{ non-conformance} \times \text{cost of conformance} = \text{constant}$$

Plot a graph of % non-conformance versus cost for the following:

- (a) Cost of non-conformance (failure)
- (b) Cost of conformance (prevention)
- (c) Total Costs

Determine the most economical % non-conformance from the graph of total cost.

(12 Marks)

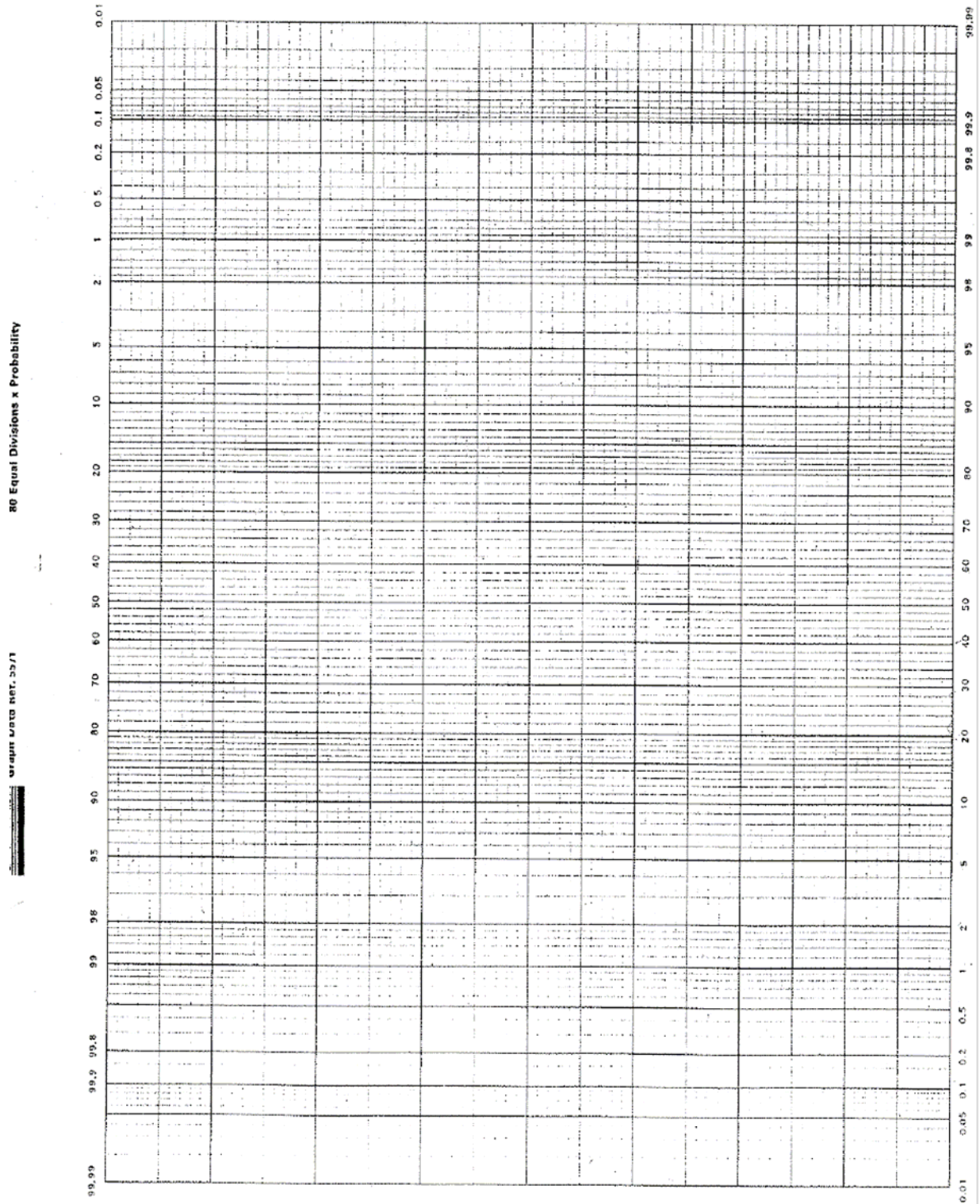
Q6. (a) Outline the importance of quality audits in a Total Quality Management System

(5 Marks)

(b) Write an overview of quality audits under the following headings:

- (i) Type and depth of audit (4 Marks)
- (ii) The audit plan (5 Marks)
- (iii) Performance of the audit (5 Marks)

- (c) List three key areas which should be audited in a drug manufacturing audit program checklist (6 Marks)







QUESTION  
NUMBER

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