

FACULTY OF APPLIED SCIENCES SBB 2211/03
BACHELOR OF SCIENCE HONOURS DEGREE EXAMINATIONS
DEPARTMENT OF APPLIED BIOLOGY AND BIOCHEMISTRY
THEORY: PRINCIPLES OF QUALITY ASSURANCE SBB 2211

APRIL/MAY 2003
X: 2 1/2 Hours (100 marks)

INSTRUCTIONS

Answer **FOUR** (4) questions. Each question carries 25 marks. Where a question contains subdivisions, the mark value for each subdivision is given in brackets. Illustrate your answer where appropriate with large, clearly labelled diagrams.

1. (a) Quality costs are really divided into:
- Failure
 - Appraisal
 - Prevention
- Illustrate with the aid of a sketch the relationship between these costs and the quality of production (quality of conformance) and explain the "Principle of minimum overall cost". (10 marks)
- (b) In a food canning factory, the cost of 1% of scrap is approximately \$2 000 per week. At present, the scrap level is running at 8% and approximately \$6 000 per week is being spent on prevention costs. It is known that the following relation holds:
- $$\text{Scrap (\%)} \times \text{Prevention cost} = \text{Constant}$$
- Draw a graph showing cost vertically and scrap percentage horizontally, and then plot curves for:
Prevention cost
Scrap cost
Total cost (12 marks)
 - Deduce the scrap percentage at which the total cost is a minimum. (3 marks)
2. (a) Write briefly on the following:
- Quality indices (5 marks)
 - Vendor relations (5 marks)
 - Producer's risk and Consumer's risk (6 marks)
- (b) Describe, with examples, THREE main categories of defects used within a quality system. (9 marks)

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3. (a) Describe briefly how Subjective standards differ from standards defined by variables or gauged attributes. (7 marks)
- (b) Give an example of a subjective standard and describe how the subjective nature of your example would be controlled. (8 marks)
- (c) Distinguish between
- (i) precision and accuracy (6 marks)
 - (ii) patrol inspection and in-process inspection (4 marks)
4. (a) Describe one motivational technique with an example of its application and stating its impact on quality improvement in the long term. (10 marks)
- (b) An employment agency monitoring employee absences on a daily basis, over a two week period, compiled the following percentage figures
5.1, 6.0, 4.3, 5.2, 5.1, 6.0, 5.4, 4.9, 5.1, 5.6, 5.2, 4.7, 5.1, 6.0
From these figures calculate the
- i. mean (3 marks)
 - ii. median (2 marks)
 - iii. mode (2 marks)
 - iv. range (2 marks)
- (c) Sketch the following curves
- i. Normal distribution (2 marks)
 - ii. Positively skewed distribution (2 marks)
 - iii. Negatively skewed distribution (2 marks)
5. Write brief notes on the following.
- i. Quality circles (5 marks)
 - ii. Quality loop (5 marks)
 - iii. Quality audit (5 marks)
 - iv. HACCP (10 marks)

6 (a) Define and differentiate between the terms **variable** and **attribute**.
Give two practical examples of each. (10 marks)

(b) A machine is set to produce nails of 12.05mm diameter. Samples of four pieces were taken from among the last made at intervals of 15 minutes, with the following results.

Sample No.	1	2	3	4	5	6	7	8	9	10
	12.05	12.06	12.05	12.06	12.08	12.08	12.1	12.09	12.1	12.1
	12.06	12.06	12.06	12.07	12.07	12.09	12.09	12.08	12.09	12.11
	12.05	12.05	12.07	12.08	12.08	12.09	12.07	12.1	12.11	12.12
	12.04	12.05	12.07	12.06	12.07	12.07	12.09	12.11	12.11	12.11

Plot the above data on average and range quality control charts and comment on them with regard to process capability of the machine. (15 marks)

END OF EXAMINATION QUESTION PAPER