

CHUKA



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**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF COMMERCE
(MANAGEMENT SCIENCE OPTION)**

BCOM 366: STATISTICAL QUALITY CONTROL

STREAMS: BCOM Y3S2 (ODEL)

TIME: 2 HOURS

DAY/DATE: THURSDAY 07/08/2025

8.30 A.M. – 10.30 A.M

Instructions: **Answer question ONE (Compulsory) and any other Two questions**

Question One

- a) Statistical quality control is an important aspect in operations management. Discuss five benefits of statistical quality control (10 marks)
- b) A factory produces electronic circuits and records the number of soldering defects per batch. The quality team inspected 20 batches and found the following defects:

Defects per batch:

10, 12, 8, 11, 14, 9, 13, 10, 15, 12, 11, 10, 16, 9, 12, 13, 8, 14, 11, 10

Required:

- i. Construct a c-chart for the number of defects per batch. (Use 3-sigma control limits) (7 marks)
- ii. Analyze the chart and determine whether the process is in control Is the process in control? (3marks)
- c. Discuss the various dimensions of quality that a customer considers in determining the excellence of a product and services. (10 marks)

Question Two

- a) Discuss two main causes of variations that may affect the quality of a product, Giving relevant examples in each. (6 marks)
- b) Discuss four factors to consider when evaluating a sampling plan (8 marks)

c) A manufacture of cameras has determined from experience that 30% of cameras produced are defective. If a random sample of 300 cameras is examined. What is the probability the proportion is between 0.02 and 0.035 (6 marks)

Question Three

a) Explain the following terms as used in quality control

i. Lot tolerance percent defective (LTPD) (2 marks)

ii. Acceptable Quality Level (AQL) (2 marks)

b) PharmaCare Ltd produces tablets with a target weight of 500 mg. To ensure quality, the production team takes 10 tablets per sample ($n=10$) every hour and records the sample mean ($\bar{X}$) and sample range (R). The data for 12 consecutive samples is shown below:

Sample	Mean Weight ($\bar{X}$, mg)	Range (R, mg)
1	501.2	8.5
2	499.8	7.2
3	502.1	9.0
4	500.5	6.8
5	498.9	10.1
6	503.2	11.3
7	497.5	9.7
8	501.6	8.4
9	502.8	7.9
10	499.3	6.5
11	504.0	12.0
12	500.2	5.9

Required:

i. Calculate the values for central line and control limit for the mean chart (4 marks)

ii. Construct $\bar{X}$ chart using 3-sigma control limits ($n=10$). (5 marks)

- iii. Analyze the chart and determine if the process is in control. (2 marks)
- iv. Identify any out-of-control points and suggest possible causes. (5 marks)

Question Four

- a) Discuss three types of acceptance sampling plans highlighting the strength of each (10 marks)
- b) The following data refers to visual defects found at inspection of the first 10 sample of 100

Sample No.	1	2	3	4	5	6	7	8	9	10	Total
Total No. of detectives	2	1	1	3	2	3	4	2	2	2	20

Required

- i. Use the above information to obtain upper and lower control limits (4 marks)
 - ii. Represent the first ten sample results in the chart you prepare to show the central line and control limits. (6 marks)
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