



LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – STATISTICS

SIXTH SEMESTER – APRIL 2025

UST 6503 – STATISTICAL QUALITY CONTROL



Date: 30-04-2025

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION A - K1 (CO1)

Answer ALL the Questions -

(10 x 1 = 10)

1. Answer the following

- What is the main objective of Six Sigma?
- Define the purpose of a Histogram in quality analysis.
- State the primary objective of Statistical Process Control (SPC).
- Define Quality Assurance.
- Explain continuous sampling plan.

2. Fill in the blanks

- Total Quality Management (TQM) focuses on continuous _____ improvement.
- A Frequency Distribution organizes data into _____ and records how often values occur.
- The p-chart is used to track the _____ of defective items in a sample.
- _____ is a statistical measure used to determine the ability of a process to produce products within specified limits.
- In a _____, a sample of size 'n' is taken, and the lot is accepted if the number of defective items does not exceed the acceptance number.

SECTION A - K2 (CO1)

Answer ALL the Questions

(10 x 1 = 10)

3. True or False

- Statistical methods are not essential for quality improvement.
- The QQ Plot helps in identifying normality in a dataset.
- The u-chart is used when the sample size varies.
- Process capability analysis is a statistical method that measures how well a process meets its specifications.
- The Operating Characteristic (OC) Curve helps determine the risk of rejecting good lots.

4. Match the following

- | | | |
|----|-----------------|--|
| a) | Control Chart | - Identifies outliers and quartiles |
| b) | Box Plot | - Process capability |
| c) | c-chart | - Monitors variations in a process |
| d) | Cp Index | - inspecting two samples to decide whether to accept or reject a lot |
| e) | Double sampling | - Number of defects per unit (fixed sample size) |

SECTION B - K3 (CO2)

Answer any TWO of the following

(2 x 10 = 20)

- Explain the roles of Statistical Methods in Quality Improvement with examples.
- The following data represent the exam scores of 25 students in a school:
45, 48, 52, 55, 57, 60, 62, 65, 68, 70, 72, 74, 75, 78, 80, 82, 85, 87, 88, 90, 92, 94, 95, 98, 100
Construct Histogram and Stem leaf for the above data.

7.	Discuss the construction of p-chart and u-chart with an example each.										
8.	Discuss Process Capability Analysis and its Importance in Quality Control.										
SECTION C – K4 (CO3)											
Answer any TWO of the following										(2 x 10 = 20)	
9.	What is Total Quality Management (TQM)? Examine its key principles and benefits in an organization.										
10.	What is a Frequency Distribution? Examine how does it help in analyzing process quality?										
11.	Explain any five key dimensions of quality introduced by Garvin. Provide relevant example for each dimension.										
12.	Explain the Acceptance Sampling Plan and Its Importance in Quality Control.										
SECTION D – K5 (CO4)											
Answer any ONE of the following										(1 x 20 = 20)	
13.	(a) Evaluate the philosophy and basic concepts of Quality Improvement in the modern business environment. (b) Asses the concept of a Quantile-Quantile (QQ) Plot and its applications in process quality.										
14.	A manufacturing company produces metal rods, and quality control personnel measure the diameter (in mm) of rods over 10 batches. The data collected is given below. Construct $\bar{X}$ and R chart. ($A_2=0.577$, $D_4D4=2.114$, $D_3=0$)										
	Batch	1	2	3	4	5	6	7	8	9	10
	Mean	10.00	9.90	10.08	9.90	10.10	9.78	10.10	9.96	10.00	9.86
	Range	0.40	0.40	0.50	0.40	0.40	0.20	0.40	0.30	0.40	0.30
SECTION E – K6 (CO5)											
Answer any ONE of the following										(1 x 20 = 20)	
15.	(a) A hospital inspects one surgical kit per day and counts the number of defects (e.g., missing tools, rust, packaging issues)										
	Sample No.	1	2	3	4	5	6	7	8	9	10
	Defects in Surgical Kits	3	4	2	5	6	3	2	4	5	3
	Construct c-chart and interpret the result.										(10)
	(b) Explain about the Average Total Inspection (ATI) and Double Sampling Plan.										(10)
16.	(a) Discuss the Single Sampling Plan for Attributes with an Example in detail.										(10)
	(b) Explain Consumer’s and producers’ risks with an example for each.										(10)

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