

Date:10-03-2022

Registration number:

 ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27

M. Sc. Statistics - III SEMESTER

SEMESTER EXAMINATION: OCTOBER 2021

(Examination conducted in March 2022)

 **ST 9320: Quality Assurance and Reliability Analysis**

 Time- 2 ½ hrs Max Marks-70

This question paper contains two printed pages and two parts

**Part A**

 **Answer any 06 questions (3\*6=18)**

1. Explain the concept of quality.
2. Discuss about prevention costs of quality.
3. Describe Box and whisker plot.
4. Explain the chi-square control chart.
5. What are the advantages of the CUSUM control chart over the Shewhart control chart?
6. Write a brief account on BIS and ISO certifications.
7. Show that the hazard rate uniquely determines the reliability function.
8. Define a coherent system and give an example.

**Part B**

**Answer any FOUR questions (13\*4= 52)**

1. a) Explain the general principle of constructing control charts. Also describe the

 procedure of constructing control limits for $\overbar{X}$ and S charts.

1. Derive OC and ARL functions for $\overbar{X}$ chart.

 c) Discuss about different dimensions of quality. (6+4+3)

1. a) Explain process capability ratio and its measure.

 b) Explain how to improve the sensitivity of a control chart?

 c) Describe the construction of CUSUM chart. (4+5+4)

1. a) Discuss the construction and operation of EWMA chart.

 b) Give a short account on Hotelling’s T2-control chart.

 c) What is six sigma quality approach? (4+6+3)

1. a) Discuss about Dodge-Romig and military standards.

 b) Describe the operation of double sampling plan and obtain the expression for OC, ASN and ATI functions. (4+9)

1. a) Define:
2. Increasing Failure Rate (IFR)
3. Increasing failure rate average (IFRA)
4. New better than used (NBU)
5. New better than used in expectation (NBUE) and
6. Decreasing mean residual life (DMRL)

Bring out mutual implications if any, with proof.

 b) Check whether Weibull (α, β) belongs to IFR or not? (10+3)

1. a) Explain i) series system ii) parallel system iii) k-out-of-n system with example for each.

 b) Distinguish between positive and negative aging of life distributions.

 c) Derive a lower bound and upper bound for the reliability function of a system

 of components. (6+3+4)