Seat No. _____

HAK-003-1173002

M. Sc. (Sem. III) (CBCS) Examination

May - 2023

MS-302 : Statistics

(Industrial Statistics)

Faculty Code : 003
Subject Code : 1173002

Time : $2\frac{1}{2}$ Hours / Total Marks : **70**

Instructions : (1) Attempt all questions.

(2) Each question carries equal marks.

1 Answer the following questions: (any **seven**)   **14**

   (1) Control chart for defects ks known as _____ chart.

   (2) Chart for fraction is define as _____.

   (3) OC curve means _____.

   (4) Write down the all-control limits for R charts.

   (5) Write control limits for the $\bar{R}$ chart.

   (6) Upper control limit of P chart is _____.

   (7) What is the lower control limit for EWMA chart?

   (8) Pareto chart are often used in both the measure and analyze steps of _____.

   (9) Which chart is widely used in non-manufacturing quality improvement methods?

   (10) $\bar{X}$ and R chart are known as chart for _____.

2 Answer the following questions: (any **two**)   **14**

   (1) Sixteen boxes of electric switches each containing 20 switches were randomly selected from a lot of switch boxes and inspected for the number of defects per box. The number of defects per box was as follow :

Box No.	No. of Defects	Box No.	No. of Defects
1	12	9	11
2	5	10	12
3	9	11	16
4	14	12	13
5	18	13	19
6	26	14	18
7	8	15	14
8	6	16	21

Calculate limits of C-chart and draw conclusion.

(2) Explain Process Capability Index and Operating characteristic Curve.

(3) Explain Dodge - Roming Sampling Plans.

3 Answer the following questions: **14**

(1) Fraction nonconforming is defined as the ratio of the no. of nonconforming item in a population to the total no. of item in that population.

Sample no.	no. of defective (Di)	Sample no.	no. of defective (Di)
1	3	11	2
2	2	12	4
3	4	13	1
4	2	14	3
5	5	15	6
6	2	16	0
7	1	17	1
8	2	18	2
9	0	19	3
10	5	20	2

Calculate control limits and draw conclusion.

(2) Explain choice between attributes and variable control charts.

OR

3 Answer the following questions: **14**

(1) Explain the exponentially weighted moving average control chart for monitoring the process mean.

(2) Explain Pareto chart in statistical quality control.

4   Answer the following questions: (any **two**)   **14**
    (1) Explain Hotelling T^2 control chart.
    (2) When to use X-Bar and R charts. Give real life example.
    (3) Define defect concentration diagram and write its uses.

5   Answer the following questions: (any **two**)   **14**
    (1) Explain the sample mean vector and covariance matrix of the multivariate normal distribution.
    (2) Explain control charts for non-conforming and fraction.
    (3) What is the role of attribute charts in the manufacturing organization? Give an appropriate example.
    (4) Explain moving average and exponentially weighted moving average charts.

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