

Indian Statistical Institute, Bangalore
MS (QMS) First Year
Second Semester - Advanced Statistical Process Control

Back Paper Exam
Maximum marks: 100

Date: Jun 13, 2019
Duration: 3 hours

1. [5 + 15 = 20]
- a) Specify the conditions, under which a group control chart can be established in a process.
- b) A machine has four heads. Samples of $n = 5$ units are selected from each head, and \bar{x} and R values of the characteristic are computed. Setup group control chart for this process.

Head

Sample No.	1		2		3		4	
	\bar{x}	R	\bar{x}	R	\bar{x}	R	\bar{x}	R
1	23	2	24	1	26	2	23	3
2	21	1	23	2	22	4	24	4
3	24	2	22	5	23	3	27	2
4	35	3	24	3	22	1	21	5
5	24	1	20	2	21	1	23	1
6	23	2	21	1	24	2	22	2
7	21	1	23	2	28	5	24	1
8	22	2	24	4	21	2	25	2
9	20	2	22	3	22	1	21	3
10	21	1	25	1	23	3	23	5

2. Prepare a short run version of c-chart for the given 100% inspection data of a component. [15]

Sample No.	Variety	No. Impacted	No. Rejected
1	A	240	22
2	B	236	13
3	B	137	9
4	C	421	33
5	D	329	17

6	A	210	15
7	B	410	18
8	B	323	24
9	C	323	29
10	B	167	7

3. Write short notes on (any four):-

[4 x 5 = 20]

- a) SPC implementation
- b) SPC v/s EPC
- c) Dominance System
- d) Chain Sampling
- e) Taguchi concept of loss function

4.

[5 + 10 + 5 = 20]

- a) State the β -correction procedure.
- b) Derive the β -correction factor.
- c) State the Control method.

5. Compute the β -correction table from the consecutive 16 observation for the product characteristic 25 ± 5 mm. [20]

25, 20, 20, 20, 25, 25, 27, 25, 22, 22, 28, 25, 25, 28, 28, 30.

6.

[10 + 5 = 15]

- a) State the continuous sampling methods (csp-1, csp-2, csp-3).
- b) Compute the $P(A)$ for the quality $p = 0.01$ and 0.015 for the csp plan $i = 50$, $f = \frac{1}{3}$.

7. Calculate the probability of acceptance for a chain sampling plan for the following lot quality $p = 0.005$, 0.01 and 0.015 . [10]
