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

Final Exam Maximum marks: 60 Date: April 22, 2024 Duration: 3 hours

1.

[3 + 12 = 15]

a) When to use single sampling plan with zero acceptance number and a chain sampling plan?

b) Calculate AQL, AOQL and LTPD for the below plans and offer your comments.

i) n = 5, c = 0 ii) n = 5, i = 2

2.

[3 + 7 + 10 + 3 + 2 = 25]

a) Describe the purpose and method of implementing Taguchi's β -correction method in a continuous process.

b) Derive the β -correction factor for a continuous characteristic in a manufacturing process.

c) Date has been collected from a process for the characteristics 100 ± 5 mm. 16 observation have been collected with an interval of 5 minutes.

85, 90, 95, 95 100, 98, 102, 105, 108, 102, 110, 106, 110, 112, 108, 109

- Compute the β -correction factor by using Nested ANOVA (\propto = 0.05), present all ANOVA table with calculation.

- Calculate the limit for no correction.

- Calculate the amount of correction for any 2 observation which require correction.

3.

[5 + 10 = 15]

 $[5 \ge 2 = 10]$

a) Illustrate CSP - 1, CSP - 2 and CSP - 3 plans with their need for application.

b) Compute AQL, LTPD, AOQL values for the CSP - 1 plan i = 50, $f = \frac{1}{r}$

4. Write short notes (any 2)

a) Variable sampling plan method. Compare with attribute sampling plan.

b) Problem of over adjustment during process correction. How to overcome the same?

c) The data of a continuous products characteristic was collected, and the average and s.d. was found to be 10.23 and 1.03 mm. The specification of the part is 10 ± 1 mm. Calculate the expected loss if the loss/part is zero up to one s.d. from mean and their thereafter it increases by Rs. 1 for each subsequent increase of one unit of s.d.