Seat No. : _____

AD-104

April-2016

B.Sc., Sem.-VI

CC-309 : Statistics
(Statistical Quality Control)

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) **All** questions (Q-**1** to Q-**4**) carry equal marks.
(2) Question-**5** : **2** marks for each part.
(3) Scientific calculator can be used.

1. (a) Discuss briefly the need and utility of Statistical Quality Control in industry.

OR

Explain how a control chart helps to control the quality of a manufactured product.

(b) Write a brief note on 'Criterion for detecting lack of control'.

OR

Explain the terms 'Chance causes' and 'Assignable causes' of variation as used in statistical quality control.

2. (a) Obtain the control limits for $\bar{X}$ chart and R-chart and discuss the significance of joint study of these charts.

OR

Explain and derive O.C. function of $\bar{X}$-chart.

(b) Write a short note on S-chart and its interpretation.

OR

Write a short note on u-chart and its interpretation.

3. (a) What do you understand by acceptance sampling procedure ? State its uses giving illustrations.

OR

Explain the following terms for single sampling plan ?

(i) AQL and LTPD

(ii) Producer's risk and Consumer's risk

(b) Explain in detail double sampling for attributes.

OR

What is Average Sample Number (ASN) and Average Total Inspection (ATI) ? Explain the method of their calculation for single sampling plan.

4. (a) Discuss the advantages and disadvantages of sampling inspection plans for variables compare to sampling inspection plans for attributes.

OR

Derive sampling inspection plan for variables when lower specification limit is known and lot standard deviation is unknown.

(b) Derive sampling inspection plan for variables when upper specification limit is known and lot standard deviation is unknown.

OR

(i) In a certain sampling inspection, the number of defectives found in 10 samples of 100 each are : 16, 18, 11, 18, 21, 10, 20, 18, 17, and 21. Do these indicate that the quality characteristic under inspection is under statistical control ?

(ii) For a double sampling plan : ($N = 2000$, $n_1 = 50$, $c_1 = 2$, $n_2 = 60$, $c_2 = 5$) where N = the size of the lot, n_1 = the size of the first sample, c_1 = the maximum allowable number of defectives for acceptance on the basis of the first sample, n_2 = the size of the second sample, c_2 = the maximum allowable number of defectives for acceptance on the basis of the two samples. Interpret the above plan and point out its superiority over a single sampling plan.

5. Answer the following

(1) Derive the control limits for control chart based on defects per unit.

(2) When S-chart is used in place of R-chart ?

(3) Define ‘High spot’ and ‘Law spot’ points.

(4) When np-chart is preferred to p-chart ?

(5) Write interpretation of the sample points that falls below the LCL on np-chart.

(6) What are modified control limits ?

(7) Distinguish between AQL and AOQL.

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