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3 (Sem-4/CBCS) STA HC 3

2023

**STATISTICS**

(Honours Core)

Paper : STA-HC-4036

**(Statistical Quality Control)**

Full Marks : 60

Time : Three hours

**The figures in the margin indicate full marks for the questions.**

1. Answer the following as directed :  $1 \times 7 = 7$

(a) The variation due to \_\_\_\_\_ factors is tolerable.  
(Fill in the blank)

(b) Which one of the following is not a control chart for variable ?

(i)  $\bar{X}$  - chart

(ii)  $\sigma$  - chart

(iii) R - chart

(iv) C - chart

(Choose the correct option)

Contd.

(c) In case of large samples \_\_\_\_\_ charts should preferably be used.  
(Fill in the blank)

(d) In the construction of a control chart the extreme control limits are fixed at a distance of

- (i)  $\sigma$
- (ii)  $2\sigma$
- (iii)  $3\sigma$
- (iv)  $1.96\sigma$

(Choose the correct option)

(e) Define OC curve.

(f) In SQC, when is  $\bar{X}$ -chart used ?

(g) Control chart for fraction defective is a type of control chart for variables.

(State True or False)

2. Answer the following questions :  $2 \times 4 = 8$

(a) What are the control limits for R-chart ?

(b) Mention two utilities of SQC technique in industrial production.

(c) Write down the control limits in P-chart if 50 mobiles are found defective in a consignment of 200 mobiles.

(d) Distinguish between product control and process control in SQC.

3. Answer **any three** of the following questions :  $5 \times 3 = 15$

(a) Write a note on criterion for detecting lack of control in  $\bar{X}$ -chart.

(b) Explain the basic principles underlying the construction of control charts bringing out the difference between 'natural tolerance limits' and 'specification limits'.

(c) Explain in brief the purpose and advantages of C-chart.

(d) Explain briefly the overview of six-sigma limit.

(e) Explain the following terms :

(i) Lot Tolerance Proportion Defective (LTPD)

(ii) Acceptance Quality Level (AQL)

4. What do you understand by sampling inspection plan ? Explain the concept of producer's risk and consumer's risk in such plan. Describe briefly the single sampling inspection plan.  
 $2+4+4=10$

**Or**

What are chance causes and assignable causes in SQC ? Explain the concepts of product control and process control. Describe briefly the double sampling inspection plan.  $3+3+4=10$

5. What are the  $\bar{X}$  and  $R$  charts ? What purpose do they serve ? What are their advantages over the  $P$  chart ?  $4+4+2=10$

**Or**

What is Average Sample Number (ASN) and Average Total Inspection (ATI) ? Explain the method of their calculation for single sampling plan. Why are ASN and ATI calculated ?  $4+5+1=10$

6. Explain how a control chart helps to control the quality of a manufactured product. Justify for using the  $3\sigma$ -limits in the control charts irrespective of the actual probability distribution of the quality characteristic.  $5+5=10$

**Or**

What is statistical process control ? Describe seven tools of it.  $3+7=10$