1057
B.A./B.Sc. (General) Sixth Semester
Statistics
Paper – 303: Statistical Quality Control and Computational Techniques

Time allowed: 3 Hours   Max. Marks: 65

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Unit. Use of electronic calculators with four basic mathematics operations and up to one memory is allowed. Statistical tables and log tables will be provided on request.*

x-x-x

I. a) Answer the following:-

    i)   Write lower and upper control limits for mean chart and range chart.
    ii) Write the name of different algebraic methods of interpolation.
    iii) What are the fundamental assumptions on which methods of interpolation are based?
    iv) Name different methods to find the initial transportation cost.   (4x2)

    b) Answer the following questions:

    i) Given that the process fraction defective is 0.2 and n=25. Find the control limits for p-chart.

    ii) In the context of SQC, what is an OC curve? How is an ideal OC curve shaped?   (2x2½)

UNIT – I

II. a) Explain the term 'Statistical Quality Control'? Point out its merits and limitations. How is the 'Process Control' achieved with the help of 'Control Charts'? How are control limits set up?   (10)

    b) A drilling machine bores holes with a mean diameter of 0.6230cm and a standard deviation of 0.0032cm. Calculate the 2-sigma and 3-sigma upper and lower control limits for means of sample of size 4.   (10,3)

III. Explain the following terms:-
    a) Control charts for variables
    b) Control charts for attributes   (2x6½)

IV. a) Explain the construction of double sampling plan. Obtain ASN, AOQL and ATI for double sampling plan.

    b) Based on 15 sub-groups each of size 200 taken at intervals of 45 minutes from a manufacturing process, the average fraction defective was found to be 0.068. Calculate the value of central line and upper and lower control limits.   (8,5)

V. a) Write a short note on *any three* of the following:-
    i)   Producer risk
    ii)   Consumer risk
    iii)   AQL, LTPD and AOQL
    iv)   Acceptance Sampling Plan   (3x3)

    b) Distinguish between random variations and assignable variations.   (4)

VI. a) Differentiate between Newton's Forward Method and Newton's Backward Method for Interpolation.

b) Given the following pairs of corresponding values of X and Y:

X	20	25	30	35	40
Y	73	198	573	1,198	1,450

Estimate the value of Y for X=22.   (7,6)

VII. a) Write short notes on <u>any two</u> of following:-
   i)   Trapezoidal Rule.
   ii) Simpson's One Third Formula.
   iii) Lagrange' s Method of Interpolation   (2x4)

b) Use a suitable interpolation method to find the value of Y when X=5 from the following data:-

X	2	3	4	6	7
Y	1	5	13	61	125

(5)

VIII. a) Define Linear Programming. What is meant by objective function in LP model? Explain the general formulation of LPP.

b) Solve the linear programming problem by simplex method Maximize $50X_1+60X_2$

Subject to :
$$2X_1+X_2 \le 300$$
$$3X_1+4X_2 \le 509$$
$$4X_1+7X_2 \le 812$$

Such that $X_1 \ge 0$; $X_2 \ge 0$ (6,7)

IX. a) Write mathematical model for general transportation problem.

b) Find the initial basic feasible solution by North West Corner Rule of the following Transportation Problem:

	D	E	F	G	Availability
A	7	8	9	11	230
B	5	11	8	7	280
C	4	23	3	12	180
Requirement	160	100	300	130	690

(5,8)

x-x-x