2062

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.1 which is compulsory and selecting two questions from each Unit. Use of simple non-programmable calculator is allowed. Statistical tables and log tables will be provided on request.*

x-x-x

1. Answer briefly the following:

   (a) What is theme behind the use of R-chart in Statistical quality control?
   (b) What is the difference between assignable variation and chance variation?
   (c) Define basic feasible solution and optimal basic feasible solution.
   (d) Name different methods to find the initial transportation cost.
   (e) Define iterative methods?   (3, 3, 3, 2, 2)

Unit – I

2. (a) What do you understand by control charts in Statistical quality control? What is the rationale behind setting of control limits?

   (b) Describe control charts for $\bar{X}$ (mean) and R (range) along with the expressions of their limits.   (5, 8)

3. (a) What role does Statistical quality control play in maintaining of quality of a product?

   (b) How will you prepare the control chart for fraction defectives? When should control charts for fraction defectives be prepared?   (6, 7)

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

   (b) Define the following terms:-
       (i)   AOQ and AOQL
       (ii) Consumer's risk
       (iii) LTPD
       (iv) ASN and ATI   (5, 8)

5. Explain the construction of double sampling plan along with flow diagram. Obtain ASN, ATI and OC functions for double sampling plan. Also write the merits and demerits of double sampling plan.   (13)

P.T.O.

Unit – II

6. (a) Differentiate between Newton's Forward method and Newton's Backward method for interpolation.

(b) Construct the divided difference table for the following data. Hence, find the interpolating polynomial and an approximation to the value of $f(7)$.

x	0.5	1.5	3.0	5.0	6.5	8.0
$f(x)$	1.625	5.875	31.0	131.0	282.125	521.0

(6, 7)

7. (a) Find the first derivative of $y = f(x)$ at $x = 0$ given that:

x	0	1	2	3	4	5
$f(x)$	4	8	15	7	6	2

(b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule and (ii) Simpson's one third formula.

(5, 8)

8. (a) Define Linear Programming? Discuss the applications of Linear Programming. Explain the general formulation of linear programming problem.

(b) Solve the following linear programming problem by artificial variable technique:

Maximize $Z = 3X_1 - X_2$
Subject to

$$2X_1 + X_2 \leq 2$$
$$X_1 + 3X_2 \geq 3$$
$$X_2 \leq 4$$
$$X_1, X_2 \geq 0.$$

(7, 6)

9. (a) Explain transportation problem giving example. Write mathematical model for general transportation problem.

(b) Find the initial basic feasible solution of the following transportation problem using north-west corner method:

		Destination					
		A_1	B_1	C_1	D_1	E_1	Supply
	A	2	11	10	3	7	4
Origin	B	1	4	7	2	1	8
	C	3	9	4	8	12	9
Demand		3	3	4	5	6	

(5, 8)