NRT/KS/19/2151

Bachelor of Science (B.Sc.) Semester—V Examination

STATISTICAL QUALITY CONTROL AND LINEAR PROGRAMMING PROBLEM

Optional Paper—1

(Statistics)

Time : Three Hours]   [Maximum Marks : 50

N.B. :— ALL questions are compulsory and carry equal marks.

1. (A) Discuss control charts for mean and range if (i) standards are given, (ii) standards are not given. What inference should be drawn if control chart for mean has same points outside the control limits on one side of central line and all the points on control chart for range are within the control limits ?   10

OR

   (E) Distinguish between control charts for variables and attributes. Explain the construction of d-chart. Explain why d-chart is not appropriate when the sample sizes differ. Also, explain the construction of c-chart.   10

2. (A) Discuss single sampling plan in detail.   10

OR

   (E) Describe the steps of double sampling plan.

   (F) Explain the concept of continuous sampling inspection and explain CSP-1, CSP-2, CSP-3.   5+5

3. (A) Define slack and surplus variables. Explain how a general LPP can be written as a standard LPP.

   (B) Show that a basic feasible solution is an extreme point solution.

   (C) Explain the graphical method of solving an LPP.

   (D) Define a mathematical model of a standard LPP and also define (i) feasible solution, (ii) non-degenerate basic feasible solution. $2.5 \times 4 = 10$

OR

   (E) Show that a basic feasible solution is an extreme point solution. Also, prove its converse.
                                                                                           10

4. (A) State simplex algorithm. Explain the conditions for (i) optimal basic feasible solution (ii) unbounded solution to an LPP. Also, explain the condensed simplex method.   10

OR

   (E) Discuss the artificial basis technique of solving an LPP. Explain the conditions when an LPP has :

   (i) optimal feasible solution

   (ii) unbounded solution

   (iii) degenerate solution

   (iv) no feasible solution.   10

5. Solve any *ten* of the following questions :

    (A) When can modified control limits be calculated ?

    (B) Define assignable causes of variation. Which technique can detect these presence in a manufacturing process ?

    (C) In the context of a manufacturing process, what is a rational subgroup ?

    (D) Define ATI.

    (E) Give one advantage of single sampling plan over double sampling plan.

    (F) Define consumer's risk.

    (G) If $f(x)$ is a linear function of x, then show that max $f(x)$ = –min $f(-x)$.

    (H) Define a convex set.

    (I) Fill in the blanks :

        In LPP, _____ region is a convex set and the optimal feasible solution is given by at least one _____ _____ of the region.

    (J) Derive the maximum number of possible basic solutions to an LPP.

    (K) Who developed the simplex method ?

    (L) In a simplex table, when can one decide that the LPP has infinitely many optimal feasible solutions ?   1×10=10