

Bachelor of Science (B.Sc.) Semester-V (C.B.S.) Examination

STATISTICAL QUALITY CONTROL AND LINEAR PROGRAMMING PROBLEM

Compulsory Paper—1

(Statistics)

Time : Three Hours]

[Maximum Marks : 50

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

1. (A) Discuss the role of control charts in a manufacturing process explaining assignable and chance causes of variation. Describe the construction of control chart for fraction defectives when (i) the standards are given (ii) the standards are not given. 10
- OR**
- (E) Explain the principle underlying the control charts. Describe the control chart for range and mean when (i) standards are given and (ii) when standards are not given. 10
2. (A) Describe Single Sampling Plan and in this case, derive expressions for :
 (a) Probability of acceptance
 (b) Producer's risk
 (c) ATI. 10
- OR**
- (E) Explain double sampling inspection plan. For it, derive an expression of :
 (i) O. C. function
 (ii) ASN. 10
3. (A) State a standard linear programming problem. Define :
 (i) Basic solution
 (ii) Basic feasible solution
 (iii) Degenerate solution.
 (B) Describe the graphical method of solving an LPP. 5+5
- OR**
- (E) Define Hyperplane, convex set and an extreme point of a convex set. Prove that the objective function of LPP assumes its optimum value at an extreme point of the convex set generated by the set of all feasible solution to the LPP. Also show that if it assumes its optimum value at more than one extreme points then it takes on the same value for every convex combination of these extreme points. 10
4. (A) Prove that the necessary and sufficient condition for a solution of an LPP to correspond to an extreme point is the vectors associated with non-zero elements of the solution vector are linearly independent. 10
- OR**
- (E) Define artificial variables. Explain 'Big M' method of solving an LPP.
 (F) Write 'Simplex Algorithm'. 5+5
5. Solve any **ten** of the following :
 (A) Define natural tolerance limits.
 (B) State the control limits of R-chart.
 (C) What are rational subgroups in a continuous production process ?
 (D) Define consumer's risk and producer's risk.
 (E) Define O. C. curve.
 (F) Describe how CSP-1 is modified as CSP-II.
 (G) Define :
 (i) Feasible solution
 (ii) Non-degenerate basic feasible solution.
 (H) Show that intersection of two convex sets is a convex set.
 (I) Define slack and surplus variables.
 (J) Distinguish between Simplex method and Condensed Simplex method.
 (K) State the condition to detect an unbounded solution to an LPP while solving it using Simplex method.
 (L) State the condition for degeneracy in Simplex method. 1×10=10