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

STATISTICS

Compulsory Paper—I

(Statistical Quality Control and Linear Programming Problem)

Time : Three Hours] [Maximum Marks : 50

Note :— All questions are compulsory and carry equal marks.

1. (A) Explain the principle of construction of control limits when :

   (i) The quality characteristic is normally distributed.

   (ii) The quality characteristic is not normally distributed.

   (B) Explain the construction of mean and range charts when the standards are not given. 5+5

OR

   (E) Explain the need of control charts for attributes. Develop control limits for :

   (i) Control chart for number of defectives,

   (ii) Control chart for number of defects

   when the standards are given and when the standards are not given. 10

2. (A) What is meant by sampling inspection ? Define producer's risk, consumers risk, ASN and AOQ. Give the steps of single sampling plan. 10

OR

(E) Describe double sampling plan and find the expression for producer's risk. 10

3. (A) Define a general LPP and a standard LPP. Define slack and surplus variable and also explain their use.

(B) Prove that every basic feasible solution of an LPP is an extreme point solution. 5+5

OR

(E) Define a convex set. Show that the set of feasible solutions is a convex set. Also, show that the minimum feasible solution exist at one of the extreme points of the set of feasible solutions. Hence, explain the graphical method of solving an LPP. 10

4. (A) Explain the use of artificial variables to solve an LPP. Hence, explain the Big-M method of solving an LPP. Also, explain the case of 'No feasible solution' to an LPP. 10

OR

(E) For a standard minimisation problem, explain how to generate an extreme point solution from a given extreme point solution.

Also, give the simplex algorithm. 10

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

(A) What are natural tolerance limits ?

(B) Define OC function.

(C) State the limits for C-chart when standards are not given.

(D) What is a rational subgroup ?

(E) Explain CSP-I.

(F) Give the advantages of double sampling plan over single sampling plan.

(G) Derive the upper bound to the number of basic feasible solutions to an LPP.

(H) State minimax theorem.

(I) Who developed Simplex method ?

(J) Define a non-degenerate basic feasible solution.

(K) Explain the difference between the condensed simplex method and simplex method.

(L) Let the constraints of an LPP be $x_1 + x_2 \leq 2$; $x_1 \geq 2$ and $x_1, x_2 \geq 0$. What comment can be made about the feasible solution ? 1×10