NRJ/KW/17/3151

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) Distinguish between assignable causes and chance causes of variation. In this context, explain the use of control charts. Explain the construction of control charts for mean and standard deviation when the standards are not specified. 10

OR

(E) Explain the use of control charts for attributes.

Discuss the construction of p-chart and np-chart when the standards are given and when the standards are not given.

Explain the case when the use of p-chart is recommended over np-chart. 10

2. (A) Define :
   (i) Producer's risk
   (ii) LTPD
   (iii) Consumer's risk
   (iv) ASN
   (v) ATI.

   Also, write the steps of double sampling plan. 10

OR

(E) Explain single sampling plan. Derive the expressions for consumer's risk, producer's risk, ATI and AOQ. 10

3. (A) Define a standard LPP and a basic feasible solution.

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

OR

(E) Explain the graphical method of solving an LPP. Give its limitation.

(F) Explain the use of slack and surplus variables. Also, state and prove minimax theorem and give its use. 5+5

4. (A) Consider a standard minimisation problem. In usual notation, show that if $Z_j - C_j > O$ holds for any vector P_j, then a new solution with a smaller value 'Z' of the objective function can be constructed.

   (B) State simplex algorithm. 5+5

OR

(E) Explain the need of artificial variables. Also, explain the artificial basis technique of solving an LPP. 10

5. Answer any **ten** of the following questions :
   (A) What conclusion can be drawn when natural tolerance limits are within the specification limits ?
   (B) Derive the control limits for c-chart when standards are not given.
   (C) State the control limits for control chart for SD when standards are not given.

(D) Distinguish between process control and product control techniques.

(E) Explain how CSP-1 is modified to get CSP-2.

(F) Define OC function.

(G) Define slack and surplus variables.

(H) Show that intersection of two convex sets is a convex set.

(I) In a condensed simplex method, what is 'condensed' and how ?

(J) Define an extreme point of a convex set.

(K) Who developed simplex method and who developed Big-M method ?

(L) When does an LPP possess infinitely many optimal feasible solutions ?   1×10=10