K25U 2369

Reg. No. : .....

Name : .....

V Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, November 2025
(2019 to 2023 Admissions)
CORE COURSE IN STATISTICS
5B08 STA : Statistical Quality Control and Operations Research

Time : 3 Hours Max. Marks : 48

***Instruction** : Use of calculators and statistical tables are **permitted**.*

PART – A

Answer **all** questions. **Each** carries **1** mark.

1. What is feasible solution of LPP ?
2. Give the necessary and sufficient condition for the existence of feasible solution to the general transportation problem.
3. p – chart is control chart for _____ defective.
4. Define Assignable Causes.
5. Expand AOQL.
6. Define ASN. **(6×1=6)**

PART – B

Answer **any 7** questions. **Each** carries **2** marks.

7. Define : i) Surplus variable ii) Artificial variable in an LPP.
8. Formulate the dual of the following linear programming problem :
   Maximize $z = 5x_1 + 3x_2$ subject to the constraints :
   $3x_1 + 5x_2 \leq 15$, $5x_1 + 2x_2 \leq 10$, $x_1 \geq 0$ and $x_2 \geq 0$.

P.T.O.

9. Write down the Mathematical Formulation of Transportation Problem.
10. Give any two methods of solving Assignment Problem.
11. Explain Control Chart for Variables.
12. Define the term Statistical Quality Control.
13. Write the Control limits for c – chart.
14. Explain Specification Limits.
15. What is meant by Rectifying Inspection Plans ? **(7×2=14)**

PART – C

Answer **any 4** questions. **Each** carries **4** marks.

16. Give the various steps involved in graphical method of solving an LPP.
17. Describe the procedure of North – West Corner Rule for finding initial solution of a Transportation problem.
18. A company wishes to assign 3 jobs to 3 machines in such a way that each job is assigned to some machine and no machine works on more than one job. The cost of assigning job i to machine j is given by the matrix below :
    Cost matrix : $\begin{bmatrix} 8 & 7 & 6 \\ 5 & 7 & 8 \\ 6 & 8 & 7 \end{bmatrix}$. Find the minimum cost of making the assignment.
19. Define Process Control and Product control.
20. How will you prepare the control chart for number of defectives ?
21. The following are the values of Range R for 20 subgroups of 5 readings each taken from an inspection.
    0.28, 0.14, 0.23, 0.35, 0.26, 0.25, 0.21 , 0.08, 0.19, 0.39, 0.36, 0.10, 0.23, 0.29, 0.22, 0.05, 0.23, 0.23, 0.32, 0.47. Draw the R – chart and check whether the production to be under control or not. (Given that from the control chart tables for a sample of size 5, the value of $A_2 = 0.577$; $D_3 = 0$ and $D_4 = 2.115$). **(4×4=16)**

PART – D

Answer **any 2** questions. **Each** carries **6** marks.

22. Use simplex method to solve the following LPP :
    Maximize $4x_1 + 10x_2$ subject to the constraints:
    $2x_1 + x_2 \leq 50$, $2x_1 + 5x_2 \leq 100$, $2x_1 + 3x_2 \leq 90$, $x_1 \geq 0$ and $x_2 \geq 0$.
23. Give the various steps in Hungarian Algorithm for solving a Transportation problem.
24. Explain the steps involved in the construction of control chart for mean and range. How will you interpret these charts ?
25. Outline the Procedure of Double Sampling Plan in SQC. **(2×6=12)**

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