



**2023/TDC(CBCS)/EVEN/SEM/
STSDSE-602T/278**

TDC (CBCS) Even Semester Exam., 2023

STATISTICS

(6th Semester)

Course No. : STSDSE-602T

(Operations Research)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

SECTION—A

Answer any *fifteen* of the following questions :

1×15=15

1. Write any two applications of operations research.
2. What are the three types of models used in operations research?
3. When is a mathematical programming problem called a 'linear' one?



(2)

4. What is an unbounded solution of an LPP?
5. What is degenerate solution?
6. Write the difference between feasible and basic feasible solutions.
7. Explain the term 'duality' in LPP.
8. What do you mean by artificial variables?
9. What is the advantage of using Big M method?
10. What is a balanced transportation problem?
11. When is a feasible solution to a transportation problem said to be a basic feasible solution?
12. Define assignment problem.
13. Write two applications of assignment problem.
14. What is meant by 'value of a game'?
15. Define a 'zero-sum' game.
16. Describe the term 'saddle-point' in a game.

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(Continued)

((13))

17. What is 'critical path' in network analysis?
18. Explain the term 'independent float' in network analysis.
19. What is 'holding cost' in inventory management?
20. Define PERT.

SECTION—B

Answer any *five* of the following questions : $2 \times 5 = 10$

21. Discuss, in brief, the importance of operations research in decision making.
22. What do you understand by 'graphical method'? Give its limitations.
23. Explain the standard form of LPP.
24. Explain the difference between Simplex and Dual-simplex methods.
25. Formulate the transportation problem as an LPP.
26. What is EOQ model without shortages?

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(Turn Over)



((4))

27. Explain the basic characteristics of game theory.
28. Discuss different strategies in a game.
29. Compare CPM and PERT explaining clearly the similarities and mentioning where they mainly differ.
30. Explain the terms 'stock holding costs' and 'shortage costs' in relation to inventory.

SECTION—C

Answer any five of the following questions : 5×5=25

31. What is simplex method? Explain simplex algorithm to solve LPP. 1+4=5
32. Define a basic solution to a given system of m simultaneous linear equations in n unknowns. Show that a basic feasible solution to an LPP must correspond to an extreme point of the set of all feasible solutions. 1+4=5
33. Explain the algorithm of dual-simplex method in LPP. Show that dual of the dual is the primal. 3+2=5

((5))

34. Use Big-M method to
Maximize $Z = x_1 + 5x_2$
subject to
 $3x_1 + 4x_2 \leq 6$
 $x_1 + 3x_2 \geq 2$
 $x_1 \geq 0, x_2 \geq 0$ 5
35. (a) Distinguish between non-degenerate and degenerate basic feasible solutions in transportation problem. 2
- (b) Prove that a necessary and sufficient condition for the existence of a feasible solution to an $(m - n)$ transportation problem is
$$\sum_{i=1}^m a_i = \sum_{j=1}^n b_j$$
where a_i and b_j denote the availability and requirement at the i th origin and j th destination respectively. 3
36. (a) Explain mathematical formulation of assignment problem. 2
- (b) Explain north-west corner rule for initial allocation in transportation problem. 3



37. (a) Explain the difference between transportation problem and assignment problem. 2
- (b) Discuss Vogel's approximation method for initial solution in transportation problem. 3
38. What do you mean by rectangular game? Explain the theory of dominance in the solution of rectangular games. 1+4=5
39. How does network analysis help in project work? Explain the rules for construction of a network. 2+3=5
40. What is an inventory system? Describe the basic characteristics of an inventory system. Give an outline of ABC analysis in relation to inventory. 1+2+2=5
