2021/TDC (CBCS)/EVEN/SEM/ STSDSE–602T/105

TDC (CBCS) Even Semester Exam., September—2021

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. What are the three phases of scientific methods in Operations Research?

2. Mention any two applications of Operations Research.

3. What is the reason for the name 'linear programming problem'?

22J/101 (Turn Over)

(2)

4. Define feasible solution of a linear programming problem.

5. What is the main limitation of the graphical method of solving linear programming problem?

6. Who introduced Simplex method and when?

7. Define artificial variable in linear programming problem.

8. Given a system of m simultaneous linear equations in n unknowns $(m < n)$, find the number of basic variables.

9. What do you mean by pivot element in a simplex table?

10. What do you mean by dual of a linear programming problem?

11. State the duality theorem.

12. What are the basic differences between dual simplex method and simplex method?

13. Define balanced transportation problem.

(3)

14. What is the necessary and sufficient condition for the existence of a feasible solution to a transportation problem?

15. Define unbalanced transportation problem.

16. Why Vogel's Approximation Method (VAM) gives basic feasible solution close to optimal solution?

17. Why MODI method is used in a transportation problem?

18. What are the basic differences between a transportation problem and an assignment problem?

19. Define rectangular game.

20. What is minimax-maximin principle?

21. Define dominance in game.

22. What is network analysis?

23. Define PERT.

24. Define CPM.

25. What do you mean by inventory?

(4)

26. Define ABC inventory system.

27. Give any four assumptions of EOQ model in inventory control.

28. Define 'lead time' in inventory control.

29. What are the limitations of EOQ model in inventory control?

30. Define set-up cost and shortage cost in inventory control.

SECTION—B

Answer any *five* of the following questions :

2×5=10

31. What are the assumptions of linear programming problem?

32. Why is simplex method called simplex method?

33. How is Charnes' M-technique different from simplex method?

34. Show with a simple example that the dual of a dual is the primal.

(Continued)

(5)

35. What are the important methods of finding basic feasible solution of a transportation problem?

36. Show that transportation problem is a particular class of linear programming problem.

37. Explain modified dominance property to reduce the game matrix.

38. What are the basic differences between PERT and CPM?

39. What are the characteristics of a inventory system?

40. What is EOQ model without shortages?

SECTION—C

Answer any *five* of the following questions :

5×5=25

41. Solve the following linear programming problem using graphical method :

Maximize $Z = 2x_1 + 4x_2$

subject to the constraints

$$x_1 + 2x_2 \leq 5$$
$$x_1 + x_2 \leq 4$$
$$x_1 \geq 0, \ x_2 \geq 0$$

(Turn Over)

42. Explain simplex method of solving linear programming problem.

43. Describe Charnes' M-technique for solving linear programming problem.

44. Explain dual simplex method for solving linear programming problem.

45. Describe 'MODI method' to find optimal solution of transportation problem.

46. Explain Hungarian method to find optimal solution of an assignment problem.

47. Solve the game whose payoff matrix is given below :

$$
\begin{array}{c} \\ \text{Player—B} \end{array}
\begin{array}{c} \\ B_1 \\ B_2 \\ B_3 \end{array}
\begin{array}{c} \text{Player—A} \\ \begin{array}{ccc} A_1 & A_2 & A_3 \end{array} \\ \left[\begin{array}{ccc} 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{array} \right] \end{array}
$$

48. Given the following information :

Activity	:	0–1	1–2	1–3	2–4	2–5
Duration (in days)	:	2	8	10	6	3

Activity	:	3–4	3–6	4–7	5–7	6–7
Duration (in days)	:	3	7	5	2	8

(a) Draw Network Diagram.

(b) Identify the critical path and find the total project duration.

49. Explain the reasons for carrying inventories. What are the various costs associated with inventories?

50. An item is produced at the rate of 50 items per day. The demand occurs at the rate of 25 items per day. If the set-up cost is ₹ 100 and holding cost is ₹ 0·01 per unit item per day, find the economic lot size for one run, assuming that the shortages are not permitted. Also find the time of cycle and minimum total cost for one run.

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