K19U 0126

VI Semester B.Sc. Degree (CBCSS – Reg./Supple./Improv.)
Examination, April 2019
(2014 Admission Onwards)
CORE COURSE IN MATHEMATICS
6B14 MAT : (Elective – A) : Operations Research

Time : 3 Hours

Max. Marks : 48

SECTION – A

All the first 4 questions are **compulsory**. They carry 1 mark **each**.

1. Define positive semi definite quadratic form.

2. Define the term feasible solution of a linear programming problem.

3. What is an unbalanced transportation problem ?

4. Define two person zero sum game.

SECTION – B

Answer **any 8** questions from among the questions **5** to **14**. These questions carry **2** marks **each**.

5. Show that $S = \{(x_1, x_2) : x_1^2 + x_2^2 \leq 4\}$ is a convex set.

6. Write the quadratic form $x_1^2 + 2x_2^2 - 7x_3^2 - 4x_1x_2 + 3x_1x_3 - 5x_2x_3$ in the form X^TAX.

7. Obtain all basic solutions to the following system of linear equations :

$x_1 + 2x_2 + x_3 = 4 : 2x_1 + x_2 + 5x_3 = 5.$

8. State the general LPP in the standard form.

P.T.O.

9. Give a mathematical formulation of the transportation problem.

10. Explain loops in transportation tables.

11. Explain the difference between transportation problem and assignment problem.

12. What is no passing rule in a sequencing algorithm ?

13. What are the properties of a game ?

14. Explain the concept of value of the game.

SECTION – C

Answer **any 4** questions from among the questions **15 to 20**. These questions carry **4 marks each.**

15. Prove that the set of all convex combinations of a finite number of points $S \subset R^n$ is a convex set.

16. A firm manufactures two types of products A and B and sells them at a profit of Rs. 2 on type A and Rs. 3 on type B. Each product is processed on two machines G and H. Type A requires 1 minute of processing time on G and 2 minutes on H; type B requires 1 minute on G and 1 minute on H. The machine G is available for not more than 6 hours 40 minutes while machine H is available for 10 hours during any working day. Formulate the problem as a linear programming problem.

17. What are the methods for finding initial basic feasible solution of the transportation problem ? Explain any one.

18. Describe a method of drawing minimum number of lines in the context of assignment problem.

19. What are the main assumptions made while dealing with sequencing problem ?

20. Find the saddle point of the payoff matrix.

$$\begin{pmatrix} 4 & 1 & -3 \\ 3 & 2 & 5 \\ 0 & 1 & 6 \end{pmatrix}$$

SECTION – D

Answer **any 2** questions from among the questions **21 to 24**. These questions carry **6 marks each.**

21. Solve using simplex method :

Maximize $Z = 5x_1 + 3x_2$

Subject to $3x_1 + 5x_2 \le 15$

$5x_1 + 2x_2 \le 10$ and $x_1 \ge 0$, $x_2 \ge 0$.

22. Describe MODI method in transportation problem.

23. Solve the following assignment problem ?

	1	2	3	4
A	49	60	45	61
B	55	63	45	61
C	52	62	49	68
D	55	64	48	66

24. Solve the following 2 × 3 game graphically.

Player B

Player A $\begin{pmatrix} 1 & 3 & 11 \\ 8 & 5 & 2 \end{pmatrix}$

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