



Reg. No. :

Name :

VI Semester B.Sc. Degree (CBCSS – Supple./Improv.) Examination, April 2022 (2016 – 2018 Admissions) Core Course in Mathematics (Elective) 6B14 MAT : 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 convex polyhedron.
2. State the fundamental theorem of Duality.
3. What is a necessary and sufficient condition for the existence of a feasible solution to a transportation problem?
4. What is a sequencing problem?

SECTION – B

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

- 5. Let C1 and C2 be two convex set, show that C1 + C2 = {z = x1 + x2/x1 in C1 and x2 in C2} is also convex.
6. Determine whether the quadratic form -x1^2 - 4x2^2 + 3x1x2 is positive definite or negative definite.
7. What is unbounded solution? Illustrate it graphically.
8. Obtain all basic solutions to the following system of linear equations: 2x1 + 6x2 + 2x3 = 3; 6x1 + 4x2 + 4x3 = 2.

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- 9. Explain north-west corner rule to solve transportation problem for an initial solution.
10. Explain loops in transportation tables.
11. Give a mathematical formulation of the assignment problem.
12. Give any two examples of sequencing problem.
13. Define the term 'pure strategy' and 'optimal strategy' with reference to game theory.
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. Let f(x) be a convex function on a convex set S. Prove that the set of points in S at which f(x) takes on its global minimum is a convex set.
16. Solve graphically Max Z = 2x1 + 10x2 Subject to 2x1 + 5x2 ≤ 16 6x1 ≤ 30, x1 ≥ 0, x2 ≥ 0
17. Obtain an initial basic feasible solution to the following transportation problem by Vogel's method:
Table with columns D, E, F, G, Available and rows A, B, C, Requirement

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

19. Explain the sequencing problem with n jobs and k machines.



20. For the following game, write the linear programming problem for player A :

Player B
Player A
Table with 2 rows and 3 columns of payoffs

SECTION – D

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

- 21. Solve using simplex method: Max Z = 6x1 - 2x2 Subject to 2x1 - x2 ≤ 2 x1 ≤ 4 and x1 ≥ 0, x2 ≥ 0

22. Describe MODI method in transportation problem.

23. Solve the following assignment problem :

Machines
Jobs
Table with 3 rows and 4 columns of costs

24. Describe the procedure to solve any 2x2 two person zero sum game without any saddle point.