

First Semester Model Question Paper (C.B.C.S.) Examination
Complementary Course I – (OPERATIONS RESEARCH)-Linear programming
(For B.Sc. Mathematics Model II Programme)

Time: Three Hours

Maximum: 80 Marks

Part A

Brief answer questions. Answer any ten questions. Each question carries 2 marks.

1. Find the inner product of the vector $[2,3, 4]'$ and $[4, 2,3]'$
2. State Cauchy-Schwarz inequality in E_n .
3. Give a vector linearly independent to $[1, 2]'$ in E_2 .
4. What are orthogonal vectors?
5. What is the euclidean norm of the vector $[2,3, 4]'$
6. Give an example of a set which is neither closed nor open.
7. What is the convex hull of the set $S = \{X_1;X_2\}$
8. Define local minima and maxima
9. Give an example of a convex programming problem.
10. Define basic feasible solutions
11. Define a Linear Programming problem
12. What do you mean by Degeneracy in LPP

(10X2 = 20)

Part B

Short Essay type questions. Answer any six questions. Each question carries 5 marks.

13. Determine whether the vector $[6,1,-6,2]$ is in the vector space generated by the vectors.
 $[1,1,-1,1],[-1,0,1,1],[1,-1,-1,0]$
14. Find the inner product of the vectors $[2,-3,4]$ and $[4,-2,-3]$

15. Determine whether the following matrix is positive definite or not.
$$\begin{bmatrix} 1 & 2 & 2 \\ 2 & 4 & 8 \\ 2 & 8 & 4 \end{bmatrix}$$

16. Determine whether the form $x_1^2+2x_2^2-2x_3^2-2x_1x_2-x_2x_3$ is positive definite or not.
17. Define
 - (a) General Mathematical programming Problem
 - (b) Convex Programming Problem

18. Solve graphically

Maximize $4x_1 + 2x_2$ subject to $x_1 + x_2 \leq 4$, $x_1 = 4$, $x_1 \geq 0$, $x_2 \geq 0$

19. Illustrate the relation between the set of all feasible solutions and vertices of S_F

20. Maximize $x_1 + 2x_2$ subject to $x_1 + 3x_2 \leq 4$, $x_1 \leq 4$, $x_1 \geq 0$, $x_2 \geq 0$ using simplex algorithm.

21. Minimize $2x_1 - x_2$ subject to $x_1 + x_2 \leq 4$, $x_2 \geq 4$, $x_1 \geq 0$, $x_2 \geq 0$ using Big M Method.

(6 x 5 = 30)

Part C

Essay Type questions. Answer any two questions. Each question carries 15 marks.

22. Explain the different methods to find a symmetric matrix is positive definite or not.

23. Maximize $5x_1 + 3x_2 + x_3$ subject to $2x_1 + x_2 + x_3 \leq 3$, $x_1 \leq 4$, $x_1 \geq 0$, $x_2 \geq 0$ using simplex algorithm

24. Solve Two Phase Simplex method :

Maximize $x_1 + x_2$ subject to $7x_1 - 6x_2 \leq 5$, $6x_1 + 3x_2 \geq 7$, $-3x_1 + 8x_2 \leq 6$, $x_1 \geq 0$, $x_2 \geq 0$

25. Solve graphically

Minimize $-5x_1 - 3x_2$ subject to $x_1 + x_2 \leq 2$, $5x_1 + 2x_2 \leq 10$, $3x_1 + 8x_2 \leq 12$, $x_1 \geq 0$, $x_2 \geq 0$

(15 x 2 = 30)