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S–253(C)

B. A./B. Sc. (Sixth Semester)
EXAMINATION, 2021-22
MATHEMATICS
(Linear Programming)
(SOS/Maths./DSE—002(C))

ime : Two Hours] [*Maximum Marks : 70*

lote : (i) Attempt any *five* questions from Section A and any *three* questions from Section B.

(ii) Answer each question of Section A within 50 words.

(iii) Limit your answers within the given answer book. Additional answer book (B-Answer book) should not be provided or used.

Section—A

Note : Attempt any *five* questions. Each question carries 5 marks.

1. Every closed half-space is a convex set.

P. T. O.

2. Determine all basic feasible (B. F.) solutions of the system of equations :

$$2x_1 + x_2 + 4x_3 = 11$$

$$3x_1 + x_2 + 5x_3 = 14$$

3. Explain the concept of Simplex algorithm.

4. Solve the following L. P. P.

Max. $Z = 3x_1 + 2x_2$

Subject to :

$$x_1 + x_2 \leq 4$$

$$x_1 - x_2 \leq 2$$

$$x_1, x_2 \geq 0.$$

5. What is the concept of duality ? Discuss relationship between primal and its dual.

6. Applying simplex method find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.

7. A furniture dealer deals two items, table and chairs. He has \$10,000 to invest and space to store at most 60 pieces. A table costs him \$500 and chair \$100. He can sell all the items he buys, earning a profit of \$50 on a table and \$15 on a chair. Formulate this problem as a linear programming problem (L. P. P.) so that he maximizes the profit.

Section—B

Note : Attempt any *three* questions. Each question carries 15 marks.

8. Explain Corner point method and Iso profit method of solving a L. P. P. by graphical method.

9. Sketch the convex polygon spanned by the following points in a two dimensional Euclidean Space. Which of these points are vertices ? Express the other, as the convex linear combination of the vertices (0, 0), (0, 1) (1, 0), $\left(\frac{1}{2}, \frac{1}{4}\right)$.

10. Solve the following L. P. P. using two phase method :

Max. : $Z = 3x_1 - x_2$

S. t. :

$$2x_1 + x_2 \geq 2$$
$$x_1 + 3x_2 \leq 2$$
$$x_2 \leq 4$$

with $x_1, x_2 \geq 0$.

11. Find the dual of the following L. P. P. :

Min. : $Z = x_1 - 3x_2 - 2x_3$

Subject to :

$$3x_1 - x_2 + 2x_3 \leq 7$$
$$2x_1 - 4x_2 \geq 12$$
$$-4x_1 + 3x_2 + 8x_3 = 10 .$$

with $x_1, x_2 \geq 0$ and x_3 is unrestricted.