PG CBCS M.SC. Semester-IV Examination, 2021 (MATHEMATICS) PAPER: MTM-495B

(OR METHODS USING MATLAB AND LINGO)(PRACTICAL)

Full Marks: 25

Group-A
Answer any <u>One</u> question from the following: 1X15=15

1. Write a MATLAB program to solve the following LPP:

 $Max Z = 3x_1 + 5x_2$ subject to $3x_1 + 2x_2 \le 18$ $x_1 \le 4$ $x_2 \le 6$ $x_1, x_2 \ge 0$

15

2. Write a MATLAB program to solve the following IPP:

$$Max Z = x_1 + x_2$$

subject to
$$3x_1 + 2x_2 \le 5$$

$$x_2 \le 2$$

$$x_1, x_2 \ge 0 \text{ and integers.}$$

15

3. Write a MATLAB program to solve the following QPP:

Maximize $Z = 6x_1 + 3x_2 - x_1^2 + 4x_1x_2 - 4x_2^2$ subject to the constraints: $x_1 + x_2 \le 3$ $4x_1 + x_2 \le 9$ $x_1, x_2 \ge 0$ 15

4. Write a MATLAB program to solve the following inventory problem:

The demand for an item is 18000 units per year. The inventory carrying cost is Rs. 1.20 per unit per year and the cost of shortage is

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Time: 2 Hours

1X10=10

10

Rs. 5.00 per unit per year. The ordering cost is Rs.400.00 for each order. Assuming that the replenishment rate is instantaneous, determine the optimum order quantity, shortage quantity and cycle length. 15

5. Write a MATLAB program to find the Nash equilibrium and its outcome of the following bi-matrix game $A = \begin{bmatrix} 0 & -1 \\ 1 & -10 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ -1 & -10 \end{bmatrix}$.

Group-B

Answer any <u>One</u> question from the following:

- 6. Write the solution procedure and program in LINGO to solve the following Geometric Programming Problem. Minimize $f(x) = 2x_1 + 4x_2 + 10x_1^{-1}x_2^{-1}$ 10
- 7. Write the solution procedure and program in LINGO to solve the following LPP using simplex method.

Max
$$z = 3x_1 + 4x_2$$

Subject to, $x_1 + x_2 \le 10$
 $2x_1 + 3x_2 \le 18$
 $x_1 \le 8$
 $x_2 \le 6$
 $x_1, x_2 \ge 0$

8. Write the solution procedure and program in LINGO to solve the following problem on Inventory.

An engineering factory consumes 5000 units of a component per year. The ordering, receiving and handling cost are Rs.300 per order while trucking cost is Rs.1200 per order, internet cost Rs. 0.06per unit per year, Deterioration and obsolence cost Rs 0.004 per year and storage cost Rs. 1000 per year for 5000 units. Calculate the economic order quantity and minimum average cost. 10

9. Write the solution procedure and program in LINGO to solve the following Queuing theorem problem. A telephone exchange has two long distance operators. The telephone company finds that, during the peak load long distance all arrive in a Poisson fashion at an average rate of 15 per hour. The length of service on this call is approximately exponentially distributed with mean length 5 minutes.

[3]

A. What is the probability that a subscriber will have to wait for this long distance during the peak hours of the day?B. What is the expected waiting time? 10

10. Write a LINGO program to solve the following IPP:

Minimize
$$z = 5x_1 + 3x_2$$

subject to
 $2x_1 + 4x_2 \le 12$
 $2x_1 + 3x_2 = 9$
 $5x_1 + 2x_2 \ge 10$
 $x_1, x_2 \ge 0$ and x_2 is integer.

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