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M. Sc. EXAMINATION, 2020

(Fourth Semester)

(C Scheme)

(Main Only)

MATHEMATICS

MAT618C

Operations Research

Time : 3 *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **9** is compulsory. All questions carry equal marks.

Unit I

1. Define LPP. Discuss unbounded and infinite solution in Graphical Method. Solve the LPP by Graphical Method : **15**

Min. $Z = 20x_1 + 10x_2$

Subject to

$$x_1 + 2x_2 \leq 40$$
$$3x_1 + x_2 \geq 30$$
$$4x_1 + 3x_2 \geq 60$$

and $x_1, x_2 \geq 0$.

2. Use the simplex method to solve the following LPP : **15**

Max. $Z = 3x_1 + 5x_2 + 4x_3$

Subject to

$$2x_1 + 3x_2 \leq 8$$
$$2x_1 + 5x_3 \leq 10$$
$$3x_1 + 2x_2 + 4x_3 \leq 15$$

and $x_1, x_2, x_3 \geq 0$.

Unit II

3. Given below is the unit cost array with supplies a_i (i = 1, 2, 3) and demand b_j (j = 1, 2, 3, 4) : **15**

		Sink				
		1	**2**	**3**	**4**	a_i
Source	**1**	8	10	7	6	50
	2	12	9	4	7	40
	3	9	11	10	8	30
	b_j	25	32	40	23	120

Or

Find the optimal solution to the above Hitchock problem. **15**

4. Solve the following minimal assignment problem : **15**

		Job				
		1	**2**	**3**	**4**	**5**
Problem	**A**	8	4	2	6	1
	B	0	9	5	5	4
	C	3	8	9	2	6
	D	4	3	1	0	3
	E	9	5	8	9	5

Unit III

5. Derive EOQ model for deterministic demand when repenishment rate in infinite and shortages are permitted. **15**

6. Define Inventory. What are the advantages and disadvantages of having inventories ? **15**

Unit IV

7. Explain, how Gomory's cutting lane algorithm works. **15**

8. Use the Kuhn-Tucker conditions to solve the follwing N.L.P. problem : **15**

Maximize $Z = 7x_1^2 - 6x_1 + 5x_2^2$

Subject to

$$x_1 + 2x_2 \leq 10$$

$$x_1 - 3x_2 \leq 9$$

and $x_1, x_2 \geq 0.$

9. (a) Define Dual Simplex method. **4**

(b) Define Hungarian method. **4**

(c) Explain the following : **4**

(i) Arrival pattern

(ii) Service discipline.

(d) Write the Kuhn-Tucker condition for NLPP. **3**