Math-2.5

Sl.No. : **Total No. of Pages : 3**

II Semester M.Sc. Degree Examination, May- 2025
(Non-CBCS : SLM Scheme)
MATHEMATICS
Operation Research

Time : 3 Hours **Max. Marks : 80**

Instructions : 1) Answer any five full questions.
2) All questions carry equal marks.

Q1) a) What is an operation research? Describe the origin of operation research.

b) Explain the role of operational research in decision making.

c) Explain the steps involved in the solution of an operation research problem.

[5+5+6]

Q2) a) Solve the LPP by graphical method :

Maximize : $z = 45x_1 + 80x_2$

Subject of constraints : $5x_1 + 20x_2 \leq 400$

$10x_1 + 15x_2 \leq 450$

$x_1, x_2 \geq 0$

b) Solve by using the simplex method

Maximize : $z = x_1 - 3x_2 + 2x_3$

Subject to constraints : $3x_1 - x_2 + 2x_3 \leq 7$

$-2x_1 + 4x_2 \leq 12$

$-4x_1 + 3x_2 + 8x_3 < 10$

$x_1, x_2, x_3 \geq 0$

[8+8]

Q3) a) Solve by two - phase simplex method :

Maximize : $z = 5x_1 - 2x_2 + 3x_3$

Subject to constraints : $2x_1 + 2x_2 - x_3 \geq 2$

$3x_1 - 4x_2 \leq 3$

$x_2 + 3x_3 \leq 5$

$x_1, x_2, x_3 \geq 0$

b) What are the rules for constructing the dual form and the primal form of a LLP?

[10+6]

Q4) a) Write the algorithm of Dual simplex method. Solve the following LPP by using this method :

Minimize : $z = 3x + y$

Subjected to constraints : $x + y \geq 1$, $2x + 3y \geq 2$; $x, y \geq 0$

b) Explain the advantages of the dual simplex method.

[12+4]

Q5) a) Define the following terms with reference to the transportation problem.

i) Feasible solution

ii) Basic feasible solution

b) State and prove the necessary and sufficient condition for the existence of a feasible solution to the transportation problem.

c) Find the optimum solution of the transportation problem.

	A	B	C	Availability
I	2	7	4	5
II	2	3	1	8
III	5	4	7	7
IV	1	6	2	14
Requirements	7	9	18	34

[2+6+8]

Q6) a) State and prove duality theorem.

b) Describe the flungerian method of assignment problem.

[8+8]

Q7) Solve (3×3) game by the simplex method of linear programming whose payoff matrix given below **[16]**

3	– 1	–3
– 3	3	–1
–4	–3	–3

Q8) a) Describe the classification of quening models.

b) What are the limitations for application of queueing model? Explain.

c) Explain the concept of probability distribution in queing system.

[4+4+8]

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