Math 2.5

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First Year M.Sc. Degree Examination, May - 2026
(SLM Scheme) (NON CBCS) (Second Semester)
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 are the different phases of operation Research? Explain.

b) Explain the characteristics of LPP and write the application of LPP.

[8+8]

Q2) a) Solve the LPP by Graphical Method :

Maximize : $Z = x_1 + x_2$

Subject to constraints : $x_1 + 2x_2 \leq 2000$

$x_1 + 2x_2 \leq 1500$

$x_2 \leq 600$

$x_1, x_2 \geq 0$

b) Solve by using the Simplex method :

Maximize : $Z = 3x_1 + 2x_2 + 5x_3$

Subject to Constraints : $x_1 + 2x_2 + x_3 \leq 430$

$3x_1 + 2x_3 \leq 460$

$x_1 + 4x_2 \leq 420$

$x_1, x_2, x_3 \geq 0$

[6+10]

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Q3) a) Solve by Big-M method

Maximize : $Z = 3x_1 - x_2$

Subject to Constraints : $2x_1 + x_2 \geq 2$

$$x_1 + 3x_2 \leq 3$$

$$x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

b) State and Prove Duality Theorem.

[10+6]

Q4) a) By using Dual Simplex method solve the

LPP-Maximize : $Z = -2x_1 - 2x_3$

Subject to Constraints : $x_1 + x_2 - x_3 \geq 5$

$$x_1 - 2x_2 + 4x_3 \geq 8$$

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

b) Write the algorithm of dual simplex method.

[10+6]

Q5) a) Write algorithm to find the initial basic feasible solution to transportation problem by using Row minima method.

b) Find the optimum solution for the following transportation problem.

	D_1	D_2	D_3	D_4	Available
O_1	5	3	6	2	19
O_2	4	7	9	1	37
O_3	3	4	7	5	34
Required	16	18	31	25	

[6+10]

Q6) a) State and Prove duality theorem.

b) Find the optimum solution of the given assignment problem.

		Person			
		1	2	3	4
Jobs	A	2	3	4	5
	B	4	5	6	7
	C	7	8	9	8
	D	3	5	8	4

c) Explain the significance of the game theory.

[6+6+4]

Q7) a) Describe the classification of queuing models.

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

c) Obtain the expression for the probability density function of waiting time distribution (excluding service time)

[4+4+8]

Q8) If the arrivals are completely random in a queuing system, then prove that the probability distribution on number of arrivals in a fixed time interval follows a Poisson distribution.

[16]