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MASTER OF COMPUTER APPLICATIONS

(Specialization in Data Science)

EXAMINATION : JANUARY- 2025

SEMESTER - III

Sub: Optimization Techniques (MCDS23-305)

Date : 11/01/2025

Total Marks :60

Time: 10.00 am to 12.30 pm

Instruction:

1. All questions are compulsory unless and otherwise stated.
2. Bold figures to the right of every question are the maximum marks for that question.
3. Candidates are advised to attempt questions in order.
4. Answers written illegibly are likely to be marked zero.
5. Use of scientific calculators, Log tables, Mollier Charts is allowed.
6. Draw neat and labelled diagram wherever necessary.

Q.1. Answer the following in 2-3lines. (Any 5) (10)

1. Define the role of assumptions in linear programming.
2. What is constrained optimization?
3. What is unconstrained optimization?
4. What is the simplex algorithm?
5. State the difference between CPM and PERT.
6. What is the purpose of sensitivity analysis in transportation problems?
7. What is a two-person zero-sum game?

Q. 2. Answer the following in short. (Any 4) (20)

1. Define the concept of saddle points in game theory and explain their importance in two-person zero-sum games.
2. Mathematically formulate the transshipment problem for a scenario with three sources and three destinations.
3. Explain the Kuhn-Tucker conditions and their significance in optimization.
4. Solve the following using the graphical method:
Maximize $Z=30x+20y$, subject to:
 $x+y \leq 6$,
 $2x+y \leq 8$,
 $x, y \geq 0$.
5. Use the graphical method to solve $3x+4y=24$, $x+y \geq 8$, $x, y \geq 0$.
6. What are the conditions for identifying local minimum and maximum values in single-variable optimization?

Q. 3. Answer the following in detail. (Any 3)

(30)

1. What are the conditions for identifying local minimum and maximum values in single-variable optimization?

	Player 2: A	Player 2: B
Player 1: X	5	-2
Player 1: Y	-3	4

2. **Transportation Problem:** Formulate and solve the following transportation problem using the Vogel's Approximation Method.

Factory/Warehouse	W1	W2	W3	Supply
F1	20	30	10	10
F2	50	40	30	8
F3	40	20	60	12
Demand	5	10	15	

3. Maximize the given function $Z=40x+50y$, Constraint $3x+y\leq 9$, $2x+y\leq 8$ and $x,y\geq 0$ use linear graph.
4. Use Lagrange method to Maximize $f(x,y,z) = 4x+6y-2z$, subjected to $2x+y+5z=1$ and $yx^2 + 2z^2 = 22$
5. Solve the following using simplex method for maximization $Z = 12x_1 + 16x_2$ subject to constraint, $10x_1 + 20x_2 \geq 120$, $8x_1 + 8x_2 \leq 80$ and $x_1, x_2 \geq 0$
